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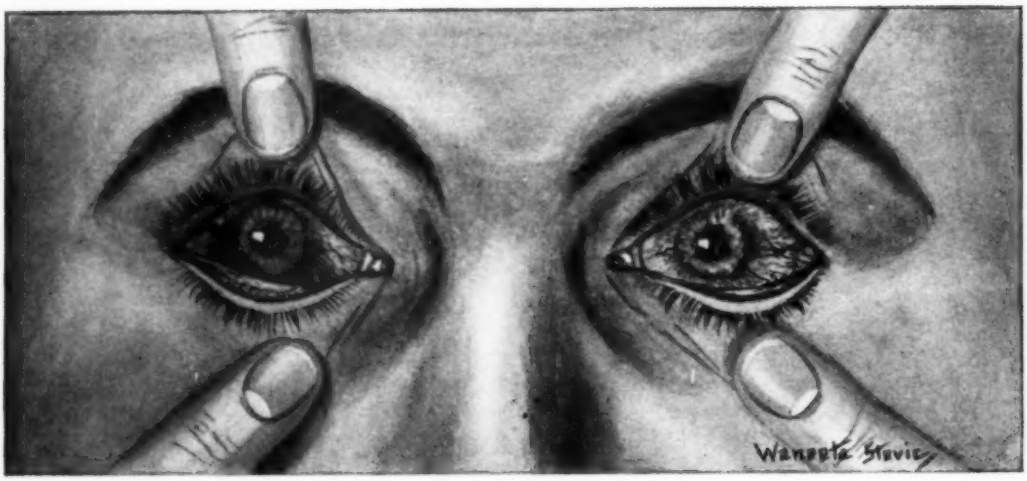

FIG. 3 (FINNOFF)

CHRONIC DIFFUSE IRITIS WITH SCLERITIS AND BEGINNING SCLEROSING KERATITIS.

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REVIEW OF LITERATURE OF CHRONIC UVEITIS

EDWARD JACKSON, M.D., Sc.D., F.A.C.S.
DENVER

The most important work on chronic uveitis has been done in the past thirty years. Interest has become fixed especially on determination of etiology. As this becomes better understood prevention becomes more possible. An exhaustive amount of work has already been done but much remains before the subject will be clear. Read in a symposium on chronic uveitis at the second annual meeting of The Association for Research in Ophthalmology, Philadelphia, June 9, 1931.

A history of its literature is implied by the terms which have been used to designate what is now called uveitis. Iris, in Greek mythology, the messenger of the gods, had as her symbol, the rainbow, also called iris. On account of its varied colors the name was applied to the prominent, colored part of the eye. Hippocrates described what we must recognize as sequels to iritis, but did not use that word. Galen wrote of choroid and choroiditis. Cyclitis seems only to have come into use after Bowman, in 1846, published his account of the ciliary body, calling attention to its muscle fibers. The word uvea, from the Latin uva, grape, was first given to the posterior layer of the iris, on account of its dark grape-like color. Later uvea included the whole of the iris structure, and four hundred years ago was used to designate the whole of the vascular, or "uveal" coat of the eye.

The word uveitis, to designate inflammation of the uvea, has appeared in the literature within the last hundred years, receiving formal recognition in Dunglison's Medical Dictionary in 1848. It was used by Mackenzie[1] in 1854; but only to indicate inflammation of the posterior layer of the iris—the original uveitis. The general use of the term uveitis, to indicate inflammation of any or all parts of the uveal tract, may be taken to begin with the symposium on Uveitis, before the Section on Ophthalmology of the American Medical Association in 1902[2]. The first paper in that symposium was by G. E. de Schweinitz on the symptomatology and etiology of uveitis. The other papers were by Hiram Woods, analysis of 37 cases; Harry Friedenwald, keratitis punctata; Howard F. Hansell, injuries productive of uveal disease; William H. Wilder, pathology of uveitis; T. A. Woodruff, non-specific treatment; and W. B. Marple, general treatment. While not devoted to etiology of uveitis, these papers mentioned various causes, and brought out the fact that lesions in different parts of the uvea arose from the same causes, emphasizing the importance of giving them a common name, uveitis.

For the literature before 1900 we are compelled to search under different titles, as iritis, irido-cyclitis, irido-choroiditis, choroiditis, cyclitis, and others. Mackenzie in 1854, as synonymous with uveitis, quoted iriditis, inflammation of the eyeball; and atresia iridis, amaurosis, retinitis, ophthalmia scrofulosa interna, iritis varicosa, ophthalmia arthritica, aquocapsulitis, acute glaucoma, and arthritic posterior internal ophthalmia, names given to what he designated as choroiditis.

One might search under all these headings and find no literature of any real value about uveitis, before Helmholtz had invented the ophthalmoscope, Virchow had written his cellular pathology, or Pasteur had demonstrated the microbic origin of disease. In prescientific medicine there was little real interest in the causes and prevention of disease. The lectures on the evolution of

modern medicine, given by Sir William Osler at Yale University in 1913, ended with one entitled the Rise of Preventive Medicine; which was more of prophecy than of history. Starting with 1902, the important literature, regarding the etiology of uveitis, has appeared within 30 years. The authors of papers today dealing with uveitis due to syphilis and tuberculosis may find references dating further back, but these scarcely meet requirements for information on etiology.

In the 1902 symposium, de Schweinitz discussed three forms of keratitis punctata, a symptom of major importance in uveitis. He gave malignant recurring cases, ending in glaucoma, cataract, or corneal infiltration, or associated with vitreous hemorrhages, but his chief references to etiology were to cases beginning with sclerotico-choroiditis and leading to myopia and posterior polar lens opacity, or occurring in senile, gouty or rheumatic subjects. References to etiology were made by Woods to anemia and tuberculosis, family history, age, sex, menstruation, acute infections and naso-pharyngeal disease. The paper of Friedenwald devoted to the Diagnostic Importance of Keratitis Punctata Interna, cites 26 cases of uveitis from his own experience. In one case "no cause could be assigned", one "patient had suffered from chronic rheumatism", one was a case of "syphilitic choroiditis", and in four the Descemetitis "was associated with 'circumscribed interstitial keratitis', or with 'scleritis' ". Generally no etiology was suggested. The paper of Hansell on "Injuries of the Eye Productive of Diseases of the Uveal Tract" reached the conclusion that "The syphilitic, diabetic or tubercular diathesis delays recovery and renders the prognosis uncertain". The other papers, by Wilder on Pathology and by Woodruff and Marple on treatment, did not deal with causes.

The Pathogenesis of Chronic Uveitis, excluding syphilitic, tuberculous and sympathetic cases, was the subject of a symposium at the London International Medical Congress, in 1913. The first paper, by Professor Fuchs[3], upon chronic endogenous uveitis, made a distinction between cases that begin with little or no sign of inflammation, until very late in the course, but with failure of vision, deposits on the posterior surface of the cornea, synechiae, vitreous opacities and choroidal changes. He excluded the cases of long standing in which the progress was by recurrences of acute attacks of uveitis. His cases, in which the eyes were submitted to pathological investigation, were all in men. It was suggested that chronic iridocyclitis is more common in women, and in women may have a different pathogenesis.

Following Professor Fuchs and taking up the biochemistry of the eye, de Schweinitz[4] pointed out that acute rheumatism is rarely a cause of uveitis; and evidence is lacking of any relationship between gout and uveitis. Therefore the terms "rheumatic" and "arthritic" uveitis should be given up. There is evidence that the majority of cases of uveitis are caused by microörganisms, or their toxins, especially by the gonococcus and the staphylococcus. The primary source of infection by the latter is usually in the mouth, tonsils and nasal sinuses, intestines or skin. He urged that gastro-intestinal intoxications are potent sources of infection; but that they should not be called auto-intoxications. The presence of uveitis is a danger signal, calling for a searching examination for general infections, of which it is usually a manifestation.

The important paper of William Lang[5] on "The Influence of Chronic Sepsis upon Eye Diseases", was read before the Royal Society of Medicine in discussion on alimentary toxemia. Many years before he had observed a connection between pyorrhea and uveal inflammation, and to that were ascribed 139 of his 215 cases due to sepsis. Most of them involved the uveal tract. Of 10 cases he cited, one is given as episcleritis, and nine presented uveal inflammation. Lang mentions no other location of lesions in the mouth; and in the nasal sinuses only 4 cases, and tonsils 3 cases; while in 33 cases the septic focus

was assigned to the colon, and in 20 to the male urethra. Uveal lesions were apportioned to the iris, 87, the ciliary body, 79, and the choroid 68, a total of 234 lesions among 215 patients. Evidently his statistics belong to the traditional period of both diagnosis and classification. They were effective in calling attention to the subject; but of no significance for comparison with statistical studies since made. Four years later, as President of the Section of Ophthalmology of the Royal Society of Medicine, Lang presented the statistics of 200 cases as to their etiology. He then found these percentages: syphilis 6, gonorrhea 12, tubercle 11, pyorrhea 37, general diseases 8.5 and other causes 25.5 percent. Among these last 51 cases, 6 were due to tonsils, 23 to alimentary tract, and 7 to genito-urinary disease. Beside the 74 cases in which only pyorrhea was found, were 22 in which it was present with other possible causes. After removal of the affected teeth, clearing up of the iritis was strikingly rapid.

The paper by Charles Goulden[6] "Inflammation of the Uveal Tract Secondary to Infection of Mucous Membranes", was a contribution to the literature of the transition period, taking up uveitis from one special point of view. He kept the separate groupings for different parts of the tract; and based his paper on the cases observed among 6,835 patients. Among 37 cases grouped as iritis, 16 are ascribed to gonorrhea, 19 to syphilis, and 2 to tuberculosis. Among the 142 cases classed under iridocyclitis the cases given were: septic teeth 64, congenital syphilis 52, sympathetic disease 3, gastro-enteritis 3, mucouscolitis 2, tonsillitis 2, atrophic rhinitis 2; one each for gastric ulcer, influenza, endometritis and bronchitis; and for 10 no cause was found. For choroiditis the causes assigned were: syphilis, acquired 3, congenital 5, septic teeth 3, purulent rhinitis 2, appendicitis 1. Although his paper is based on his cases, Goulden gives 100 references to the literature, of which four-fifths are to papers published since 1890. Goulden concludes that oral sepsis is the most common cause of uveitis, but that many cases are due to infection from a diseased mucous membrane; and that in every case, the cause of which is not obvious, every mucous membrane should be examined.

In 1894 H. Snellen, Jr.[7], published a paper pointing out that the deposits on the posterior corneal surface sometimes are largely composed of bacteria. His two cases were recent, and the organism was a short bacillus. Fuchs devoted much of his 1913 paper to a description of the uveal deposits, which he considered the characteristic exudate in chronic uveitis. He mentions the significance of the lymphocytes and occasional leucocytes they contain. But he thought the poison, which must get access to the uveal tissues through the blood stream, is not likely to consist of microörganisms, but of toxins. In this he agrees with most recent writers who touch on the subject. De Schweinitz refers to "bacteria or their toxins". But Goulden mentions, as having been demonstrated in the tissues, the gonococcus, typhoid bacillus and pneumococcus. Streptococci, bacillus pyocyaneus, and bacillus coli have been reported, and Irons[8] in two cases of colitis with ulceration found the causative organisms in the blood stream.

The paper of E. V. L. Brown and E. E. Irons[9] read before the American Ophthalmological Society in 1916, and its discussion, show the extent of the etiology of uveitis, the errors that must be avoided to reach the true diagnosis and the wide range of investigations that must be undertaken before the relative frequency of the various causes can be known, with even approximate accuracy. They mention twenty-five colleagues who assisted them, including ophthalmologists, otolaryngologists, internists, dentists and laboratory experts. Their study started with cases of iritis seen during an active stage, but certain cases showed marked involvement of the ciliary body and the choroid. In the one hundred cases studied the causes, as finally determined, were: syphilis 23, gonococcal infection 9, tuberculosis 8, dental infections 18, ton-

sillar 16, sinus infections 3, non-venereal genito-urinary 3, other infections 2, combined infections 17 and no cause found 1. In 37 cases more than one infection was held to be responsible for the inflammation. "Infections of tonsils, sinuses, and teeth, or syphilis and gonococcal infection were often found together." It was shown that reliance on a single test, like the Wassermann reaction, or the presence of tuberculous lesions in other parts of the body, must be utterly illusory and misleading. Statistics obtained on such a basis must hereafter be rejected. In discussion Dr. Irons said that perhaps three-fourths of the cases had been studied 6 or 8 months and "subsequent studies have occasionally caused us to revise our first opinion."

In 1925 A. E. Bulson[10] reported on 100 cases of endogenous iritis seen in private practice. He found 33 due to syphilis, tonsils 22, teeth 32, gonorrhea 5, antrum 3, frontal sinus, melanotic sarcoma, and syphilitic inflammation, each 1, and in two cases the etiology was not determined. C. A. Clapp[11] in 1921 published a paper on syphilis as an etiologic factor in acute iritis. He gave statistics of 100 cases; 87 from a clinic with a large colored clientele, and 13 from private practice. He found syphilis a factor in 80 percent of the cases; the evidence relied on being the Wassermann reaction, the presence of condylomata and the therapeutic diagnosis.

Irons and Brown[8] in 1923 reported a second series of 100 cases of acute iritis studied with reference to their etiology, and in 1926[12] published a paper on recurrence of iritis as influenced by the removal of infections. In the latter they reported on the history of 50 cases followed up for three to twelve years after removal of the infections. In 43 cases there was no recurrence. Of the 7 that had recurrences it was found that 4 did not have the focus removed, one had quiescent pulmonary tuberculosis and went on to blindness. In one, due to sinus infection, the eyes were quiet when last seen, but 5 years later both eyes were blind. The remaining case had a local tuberculin reaction and did not submit to re-study.

L. M. Francis[13] in 1926 proposed an etiologic classification of uveitis, largely following the one proposed by Maxwell. The exogenous group is due to direct injury of the uveal structures, that might introduce infection or foreign material with chemical irritation. The endogenous group includes:

1. Specific infectious diseases: syphilis, gonorrhea, tuberculosis, influenza, malaria, pneumonia, typhoid, typhus, the acute exanthems, true rheumatic fever, septicemia, etc.

2. Focal diseases: conjunctival infections, tonsil infections, alveolar infections, accessory air passage infections, skin infections (furunculosis), gallbladder infections, appendiceal infections, areas of infection wherever located, sympathetic ophthalmitis (?).

3. Toxins: A. Auto-intoxications: intestinal putrefactive processes, menstrual disturbances, endocrine disturbances, hypothyroidism.

B. Chemical, biochemical, proteins—lens, sympathetic ophthalmitis.

4. Disorders of general metabolism: gout, diabetes, anemia.

5. Anaphylaxis of the uvea: sympathetic ophthalmitis (?).

Some such classification would greatly simplify the study of the literature of uveitis; and, based on causes, would be relatively permanent.

The prostate as a remote focus of infection in ocular inflammations was the subject of a paper by William Zentmayer[14] in 1926. He reported four cases, in all of which there was evidence of uveitis. He concludes that the prostate infection is more often non-gonococcal than gonococcal. Only when metastatic inflammation subsides after the removal of one possible source of infection, does it prove this to have been the exciter. In a paper on ocular disease with non-dysenteric amebiasis, Lloyd Mills[15] reports 8 cases, in 6 of which uveal inflammation was found. In all of these the ocular lesion improved promptly with treatment of the amoeba infection. This seems to agree with what has been observed with regard to the frequency

of uveitis with amoebic dysentery.

The literature of experimental uveitis and of uveitis in lower animals, especially the recurring or periodic uveitis of horses, has not been referred to. It shows the very wide range in pathology and biochemistry our studies must take before we can master an adequate working knowledge of the subject.

In a single generation the etiology and prevention of diseases has advanced to the leading interests in the science and art of medicine. As to the etiology of uveitis the literature of the last thirty years outweighs in value that of all preceding centuries.

1120 Republic building.

References

[1] Mackenzie. Diseases of the eye, p. 531.
[2] de Schweinitz. Trans. Sec. on Ophth., Amer. Med. Assoc., 1902, pp. 158-223.
[3] Fuchs, E. Graefe's Arch. f. Ophth., April, 1913. Trans. Inter. Med. Cong., London, 1913.
[4] de Schweinitz. Trans. Inter. Med. Cong., London, 1913. British Med. Jour., Aug. 16, 1913, p. 396.
[5] Lang, W. London Lancet, June 23, 1913, p. 1368.
[6] Goulden, C. Royal London Ophth. Hosp. Rep., 1914, v. 19, p. 328.
[7] Snellen, Jr. Ophthalmic Review, 1894, v. 13, p. 259.
[8] Irons, E. E. Jour. Amer. Med. Assoc., 1923, v. 80, p. 1899; Ibid., 1923, v. 81, p. 1770.
[9] Brown, E. V. L., and Irons, E. E. Trans. Amer. Ophth. Soc., 1916, v. 14, p. 495.
[10] Bulson, A. E. Trans. Amer. Ophth. Soc., 1925, p. 292.
[11] Clapp, C. A. Amer. Jour. Ophth., 1921, v. 4, p. 194.
[12] Brown, E. V. L., and Irons, E. E. Trans. Sec. on Ophth., Amer. Med. Assoc., 1926, p. 199.
[13] Francis, L. M. Trans. Sec. on Ophth., Amer. Med. Assoc., 1923, p. 258.
[14] Zentmayer, W. Trans. Sec. on Ophth., Amer. Med. Assoc., 1926, p. 216.
[15] Mills, L. Trans. Sec. on Ophth., Amer. Med. Assoc., 1926, p. 228.

THE RELATION OF TUBERCULOSIS TO CHRONIC UVEITIS

WILLIAM C. FINNOFF, M.D.
DENVER

A comprehensive review of the literature on this subject is given. The first case considered probably to be ocular tuberculosis was reported in 1711, and numerous contributions made possible a wide understanding of the disease before Koch demonstrated the specific organism in 1882. Since then clinical, pathological, and experimental studies have added much exact information concerning the nature of the manifestations and the manner of its origin. Uveal tuberculosis may appear in the iris, ciliary body, or choroid. In the iris four forms are recognized: diffuse, miliary, confluent, and mixed. The ciliary body is often the first site of infection from which the disease spreads to iris, retina, choroid, and sclera. Three types of choroidal tuberculosis are described; miliary, conglobate, and disseminated.
From the Department of Ophthalmology, University of Colorado. Read in a symposium on chronic uveitis at the second annual meeting of The Association for Research in Ophthalmology, Philadelphia, May 9, 1931.

At the last meeting of this society, the discussion of the relation of tuberculosis to acute iritis was assigned to me. It was difficult to formulate definite conclusions regarding the frequency with which tuberculosis could be ascribed as the cause of acute iritis because only a few authenticated cases have been recorded in the literature. It was found that most of the acute cases represented an early manifestation of what later became a chronic disease. It was then stated that had the request been made to estimate the importance of tuberculosis in the etiology of chronic iritis the problem would have been less difficult.

Tuberculosis has been recognized as a cause of some forms of chronic uveitis for more than a hundred years. The literature is replete with reports of such cases. In 1711 Maitre-Jan[1] published a report [in his Traité des maladies d'oeil] of a soldier with an excrescence that arose in the iris and extruded through an opening in the cornea. The cornea eventually sloughed and the eye cicatrized. While the history and original description of his case are vague, it has been quoted repeatedly as the earliest recorded case of ocular tuberculosis.

In 1808 Autenrieth[2] reported a case with yellow excrescences in the choroid that occurred in a man forty years of age, who died of a disease that conforms to the general picture of what we now know to be tuberculosis. Three years later Saunders[3] described two cases with fungoid masses that had their origin in the iris, then invaded the cornea and extruded from the globe. They later diminished and the eyeball healed. At the beginning of the second half of the nineteenth century Demours[4], Delarue[5], Ritterich[6], Lawrence[7], Lincke[8], Mackenzie[9], and others, had recorded the occurrence of lesions of a similar character. Lincke was the first to introduce the term granuloma of the iris.

Jaeger[10] described an eye in which the tubercle had its origin in the ciliary body, spread forward between the base of the iris and cornea, invaded the latter, and ruptured through the globe. The eyeball eventually atrophied.

Credit has often been given to Gueneau de Mussy[11] for reporting the first authentic case of miliary tuberculosis of the iris and choroid.

The case was that of a young girl, dead at the Salpetrière of generalized tuberculosis. At the autopsy nodules were observed "with prominences on the surface of the choroid."

Jaeger[12] was the first person to study tubercles of the choroid with the ophthalmoscope. His observation was published in 1855. Several years later the patient died and the diagnosis was confirmed by post mortem examination.

It was Manz[13], of Freiburg, who first proved by microscopic examination of the eye after death that the diseased areas in the choroid visible with the ophthalmoscope were true tubercles. Manz's evidence, however, did not seem to convince the profession at that time and the discussion continued un-

til 1867 when Cohnheim[14] published his important monograph on this subject.

Cohnheim's report was based on the study of seven cases of miliary tuberculosis that were seen at the Charité in Berlin. In every case tubercles of varying size and number were seen in the choroid. He mentioned the three cases that were reported by Manz and one by Busch. Cohnheim concluded that tubercles of the choroid were identical with tubercles that occur in other organs of the body. He investigated the origin of the tubercles, their formative elements, the age at which they appeared, their coincidence with manifestations of tuberculosis in other organs of the body, and their relation to acute and chronic tuberculosis. To prove his point Cohnheim inoculated guinea pigs with tubercle bacilli and placed them under conditions favorable for development of general infection. When they died he performed autopsies and found granulations in the choroid that were similar to those that he observed in man. His reports are worthy of careful study by the student of ocular tuberculosis.

Waldenburg[15] inoculated animals with the thick mucus recovered from the surface of the pharynx of tuberculous patients and produced tuberculosis of the choroid. The experiments of Cohnheim and Waldenburg proved conclusively that the choroid may be invaded by tuberculosis.

The same year Galezowski[16] published a monograph in the Archives of Medicine, in which he described the manifestations of tuberculosis as they occur in the eye, especially the choroid. He discussed the relation of the circulation of the retina, and then cited a doubtful case in which involvement of the subvaginal space of the optic nerve aided in making a diagnosis. He believed that tuberculous material followed the sheath of the optic nerve and entered the eye along the course of the vessels. He discussed the opinions of Manz and Cohnheim, and reported a second case where the ophthalmic examination after death showed tuberculous material in the subvaginal space.

In France Bouchut[17], a pediatrician, became interested in the subject and examined the fundi in cases with tuberculous meningitis. He found tubercles in the choroid in a large number of his cases and advocated using the ophthalmoscope as an aid in making a diagnosis.

In 1868 Graefe and Leber[18] were studying the question and reported at the Charité in Berlin the finding of tubercles in the choroid in cases that were seen in the service of Griesinger. In two of their cases microscopic examinations were made by eminent pathologists and the nodules in the eye were pronounced tuberculous. The eye from Poncet's[19] case was examined microscopically by Cornil in 1868.

In 1867 Soelberg Wells[20] published an observation.

The first microscopic examination of a tuberculous iritis was made in a case of Gradenigo's[21], and was published in 1869. His description of the case is worthy of translating and quoting: "A young man of 21 years first noticed abnormal changes in the eye three months previously. There was slight edema of the lids, circumcorneal injection and three small grayish, round infiltrates in the substantia propria that were the size of a pin head and separated one from the other. They were in part situated under Bowman's membrane and in part on Descemet's membrane, and bulged into a shallow anterior chamber, which contained a hazy aqueous. Under oblique illumination the iris appeared swollen and seven to ten small rounded elevations, the size of half a grain of hempseed, projected into the anterior chamber and were principally located in the inferior-external segment. The pupil was constricted, distorted by many synechiae and the capsular surface was slightly clouded. The tension of the eyeball was normal; it was not painful, and hemorrhages occurred into the anterior chamber and disappeared spontaneously."

Furthermore, Gradenigo saw the other eye present analogous lesions and three months later the patient died of acute miliary tuberculosis. The autopsy

revealed that "The inner surface of the cornea was covered with many whitish deposits which could easily be detected from Descemet's membrane and which were composed of unresistant caseous material. A great number of small yellowish white, buttons, identical with those on the cornea, were found in the stroma of the iris, principally at its surface and along the peripheral circumference. Microscopic examination showed that their structure was absolutely identical with that of a miliary tubercle."

Berthold[22] followed with a description of the histological appearance of an eye of a child two years of age. The clinical condition in the case was then termed granuloma of the iris; the microscopic examination, a tuberculous process.

Following Gradenigo's and Berthold's reports Parinaud[23], Saltini[24], Manfredi[25], Weiss[26], Haab[27], Poncet[28], and others, reported similar cases.

Marked progress had been made in the study of tuberculosis of the uveal tract and a comprehensive understanding of the disease existed before the year 1882 when Koch[29] demonstrated that a specific microörganism was the cause of tuberculosis. At that time it was said by most students of the subject that tuberculosis of the anterior portion of the uveal tract was primary in origin and that the later general manifestations of the disease spread from the eye to other parts of the body. In the choroid, however, many contended that the disease was secondary to a focus elsewhere in the body and reached the eye after traveling through the blood stream.

Haab[30], in 1884, was the first to demonstrate the presence of the tubercle bacillus in lesions of the eye. Later Reissman[31], Wadsworth[32], Lawford[33], and others, confirmed Haab's findings.

With the demonstration of tubercle bacilli in eye lesions that were located in the uveal tract, it became certain that this part of the eye was vulnerable to the ravages of tuberculosis. The manner in which the eye was involved then became the topic of serious discussion. Some held that tuberculosis of the anterior segment of the eye, that is, of the conjunctiva, cornea, iris and lacrymal drainage apparatus, was an infection primarily from the air or from direct contact with infected material, and that metastasis often took place from the ocular site and spread to other parts of the body. It was even held by some that all forms of intra-ocular tuberculosis were primary infections. Two schools arose at that time, one with Michel[34], Parinaud[35], Terson[36], Poncet[37], Hirschberg[38] and Denig[39] as the chief exponents of the primary infection theory, and de Wecker[40], Fuchs[41], Leber[42], and Axenfeld[43] championed the secondary infection theory. They held that the uveal tract was usually infected secondarily through the blood stream from a site elsewhere in the body.

It is not surprising that Michel and his school, with the limited means for thoroughly examining the body for the detection of the presence of tuberculosis in remote parts, should arrive at such a conclusion. Even today, with the aid of the x-ray and other modern means of examination, we are often unable to demonstrate the primary focus in the living patient.

It is now generally conceded that with rare exceptions all types of tuberculosis of the uveal tract and other parts of the eye are secondarily infected from a focus in some remote part of the body.

The experiments of Frederick and Noske[44], Felix Lagrange[45], Axenfeld[43], Rollet and Aurand[46], Stock[47] and others, who studied the susceptibility of eyes of animals to tuberculosis after injecting tubercle bacilli into the blood stream, gave a scientific foundation for the secondary infection theory that is accepted by all workers today. Their experiments have not only shown us that tuberculosis of the uveal tract is a blood-borne disease, but they have also acquainted us with the different clinical forms and symptoms that uveal tuberculosis may present.

In my experiments of a more recent date[48], I was able to demonstrate that

primary tuberculosis did not occur in an eye when the epithelium was intact and could only be produced after it was abraded in some manner.

Following the discovery of tuberculin by Koch[49], in 1891, it was thought that a certain means of diagnosis had been discovered. Tuberculin was soon used as a diagnostic agent in suspected tuberculosis of the uveal tract. Leber[50] was among the first to advocate its use. Many unfavorable reactions occurred in the hands of others and it fell into disrepute for a time. When the bacillus emulsion was discovered in 1897, Von Hippel[51] tried it and became enthusiastic about its value as a diagnostic agent. Dor[52] and Darier[53] of France had great confidence in its efficacy.

On the continent and especially in Germany about the same value was attached to the constitutional or general reaction to tuberculin as was given to the Wassermann reaction in the diagnosis of syphilitic lesions. In this country, on the other hand, little value has been attached to the constitutional reaction, but a reaction in the eye at the site of the lesion—focal reaction—has been accepted rather generally by ophthalmologists as giving positive evidence that the ocular affection was tuberculous in character. In the German literature the term local reaction may be confusing because it is often used to designate what we term a focal reaction. In this country the term local designates a reaction at the site of the injection of tuberculin. Many ophthalmologists still place great faith in the diagnostic value of tuberculin; others feel that the reaction is not specific and of little importance in determining the etiology of an ocular lesion.

It is not within the province of this paper to include therapeutic measures excepting insofar as they might aid in proving the presence or absence of tuberculosis as a contributing factor in the ocular pathology. It is on this basis that a discussion of the therapeutic use of tuberculin is introduced. It is held by one school that tuberculin aids in the cure of ocular tuberculosis, and, if improvement occurs after its use in an ocular inflammation, it is therapeutic proof that the process was tuberculous in character in the same manner that the disappearance of a lesion after the administration of arsenicals, mercury, and iodides, proves it to be due to syphilis.

Bearing these facts in mind it becomes obvious that statistics on the frequency with which lesions in the uveal tract are tuberculous, vary widely and depend on the point of view of the observers reporting the cases or compiling the data.

We now know that tuberculosis plays an important part in the production of uveal diseases. Its frequency in human cases is difficult to estimate. In central Europe the percentage of cases of chronic uveitis that are classified as tuberculosis greatly exceeds the number so diagnosed in this or other countries. The only possible way to make an exact diagnosis is by microscopic examination of enucleated eyes. This, however, is done only in a relatively small number of cases. In the majority the determination of a tuberculous etiology is based on the following conditions: clinical appearance of the diseased eye, course of the inflammation, diagnostic reaction to tuberculin, influence of tuberculin on the ocular lesion, influence of therapeutic agents, effect of local treatment, the result of hygienic measures, the history of exposure to tuberulous infection, and the demonstration of active or latent foci in the body either by physical examination or by means of the x-ray. The locating of the latent foci or the finding of active clinical signs of tuberculosis is not always possible and the apparent absence of either, while adding evidence against, should not entirely exclude the possibility of tuberculosis as an etiological factor.

Not infrequently one sees the typical pathological changes of tuberculosis in microscopic sections of eyes that have been removed from persons in whom no clinical evidence of tuberculosis could be found on examination. This was clearly demonstrated in three eyes that I have examined microscopi-

cally in persons in whom no evidence of tuberculosis could be demonstrated by competent internists or by x-ray examination. I shall report one of these.

Mrs. P., aged 30 years, complained of having poor vision in the right eye for over ten years. The early history was vague. Five days before the examination the central vision of the right eye had become poorer and had grown steadily worse. She had been under the care of an eye, ear, nose and throat specialist and her ethmoidal sinuses had been opened and drained; the tonsils had been removed, but no improvement had occurred in vision. When she was first seen the vision of the right eye was 15/200 eccentrically, the left 20/20. Her general health had always been good but she gave the history of having nursed tuberculous patients in the past. The eye had not been inflamed. There was slight haziness of the vitreous and a small yellowish, slightly elevated area was present in the macula. Nothing abnormal was found in the anterior segment of the eye when it was examined with the corneal microscope and slit lamp. The Wassermann reaction was negative and no evidence of focal infection could be found in the body. There was slight dullness to percussion over the apexes of both lungs but no evidence of tuberculous activity could be found in either lung. The temperature in the afternoon was normal. X-ray examination was negative.

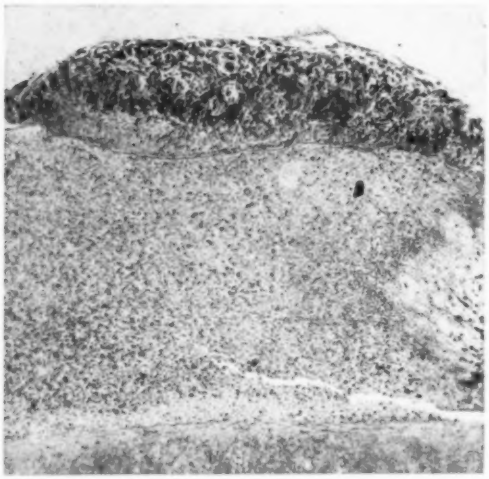

Fig. 1 (Finnoff). Solitary tubercle of choroid and retina in macular region.

A tentative diagnosis of either tuberculosis or a tumor of the choroid was made, and a course of diagnostic injections of tuberculin was advised. At this stage of the examination I left the country and I did not see the patient until four months later, at which time a cataract was present and the eye was blind and painful. During my absence a diagnosis of glaucoma had been made and when I saw her she was using eserin. Because of the pain in the eye and the history of glaucoma I suspected an intra-ocular tumor and removed the eye.

Microscopic examination of the eye revealed the presence of a large solitary tubercle that involved the choroid and retina in the macular region. The center of the mass was caseated and several typical giant cells of the Langhans type were present (Fig. 1).

After all is said and done the ophthalmologist is often compelled to make the diagnosis on the clinical appearance of the ocular process. Much has been accomplished through animal experimentation to establish the nature of tuberculous lesions in the eye. After Willemin, in 1866, described the appearance of tuberculous lesions in animals, following the injection of emulsions of tubercle bacilli into the body, positive knowledge of the nature of the lesions became established. Friedrich and Noske noted and described the lesions that appeared in the eyes of animals after injecting tubercle bacilli into the body. The implantation of tuberculous material into the anterior chamber of rabbits by Cohnheim had given some clinical data as well as means of diagnosis.

Haensell[54] in 1877 and Felix Lagrange[45] in 1893 produced lesions in the uveal tract through experimental blood stream infection. In 1907 Stock[47] did his monumental work on tuberculosis of the uveal tract. He succeeded in producing lesions of all types after injecting living tubercle bacilli into the auricular veins and not only proved that tuberculosis was a frequent cause of

uveitis, but also recorded the clinical appearance of the uveal lesions.

Other observers have confirmed Stock's findings and have added clinical and pathological knowledge to the subject. As a result of animal experiments and the microscopic study of tuberculous lesions in human eyes, we now know the clinical appearance of many tuberculous lesions of the eye. While lesions may occur in the eye in other diseases that closely simulate tuberculous foci, they can frequently be differentiated by exclusion. Syphilis, for instance, may produce nodules that resemble tubercles, but a negative Wassermann reaction or failure of improvement after the administration of arsenicals, mercury and iodides, eliminates it as a cause. Sympathetic ophthalmia can easily be excluded when there is no history of injury, sarcoma of the choroid, etc. Focal infection rarely should be confused and usually can be eliminated.

When it is feasible to remove a portion of diseased area for inoculation into the peritoneal cavity or anterior chamber of a guinea pig or rabbit, it should be tried. The development of tuberculosis in the inoculated animal will aid greatly in establishing the diagnosis. However, failure to produce tuberculosis in the animal, after employing this method, does not necessarily exclude the possibility of ocular tuberculosis.

Tuberculosis of the uveal tract occurs at all ages and affects both sexes. It, however, is usually seen in the young. Cases have been reported in infancy and O'Gilvy[55] described a case of tuberculosis of the iris that was verified histologically in a man 72 years of age. In thirty-two collected cases of tuberculosis of the iris Hill Griffith[56] found the average age of onset to be 12 years; the youngest of his cases was 4 months and the oldest 52 years of age. Pechin[57] states that tuberculosis of the iris is most frequently met with between the ages of 5 and 25 years. The greatest number, however, occurs between the fifth and thirtieth years of life.

From a review of the literature it was found that the female sex was more frequently affected than the male. The percentages of various authors differ so widely that the figures are of little value.

In general, statistics on the frequency with which both eyes are invaded vary, but in the acute miliary form both eyes are almost invariably affected. This is also true of the more chronic disseminated forms of chorio-retinitis. In diffuse and miliary iritis and choroiditis of the subacute type both eyes are usually involved, but in solitary tubercles of the choroid the activity is generally found in only one eye. There are cases in which the disease remains confined to one eye for many years, but later attacks the other.

The active process in the eye may subside and heal leaving only a scar surrounded by pigment as a record of the former disease. In other cases the eye may improve and remain quiet for a short period of time, then burst into new activity. Repeated relapses are common and as long as the patient lives there is danger of recurrence of the disease.

The symptoms of tuberculosis of the uveal tract vary with the portion of the eye that is affected. It may be divided roughly into anterior and posterior forms. In anterior uveitis the disease involves the iris and ciliary body, and in the posterior variety the choroid alone is the seat of the disease. The whole uveal tract may be involved in severe cases. It is rare to find the disease confined to the iris alone. In most cases in which the disease begins in the ciliary body it later spreads to other parts. One often finds, however, that the severity of the process is greater in one portion of the uveal tract than in the others.

It has been the custom of writers to describe tuberculosis of the uveal tract under its three separate headings, the iris, ciliary body and choroid.

Tuberculosis of the iris

Tuberculosis of the iris manifests itself in one of four ways, and may for convenience of description, be classified into four groups: (1) diffuse tubercu-

losis of the iris; (2) miliary tuberculosis of the iris; (3) confluent tubercles of the iris; and (4) mixed forms.

1. In the early stage the symptoms of diffuse tuberculous iritis are similar to those of diffuse iritis from other causes, and often cannot be distinguished from them. In this form the iris stroma becomes thickened, the vessels congested and exudates of fibrin and cells, that can be distinguished by biomicroscopy, appear in the aqueous. The iritis may be acute at its onset, but the severe symptoms soon subside and the inflammation becomes chronic. In most cases, however, the onset is gradual and painless, and in the majority nodules eventually appear in the iris stroma and make the diagnosis clear. This was shown in Jacqueau and Bujadoux's[58] case in which an iritis of the diffuse form healed under the usual treatment, but recurred a year later with the appearance of numerous nodules.

In chronic iritis Gilbert[59] found evanescent nodules at or near the pupillary margin of the iris (fig. 2) in a certain group of cases that he claimed were due either to tuberculosis, syphilis, or sympathetic ophthalmia. They could be recognized with the corneal microscope and slit lamp or with the loupe. Koeppe laid great stress on the diagnostic importance of these nodules in chronic diffuse iritis. He teaches that when syphilis and sympathetic ophthalmia can be excluded in the presence of such nodules a diagnosis of tuberculosis becomes established. The relative freedom from pain and slight inflammatory symptoms even in the more acute cases should always suggest tuberculosis.

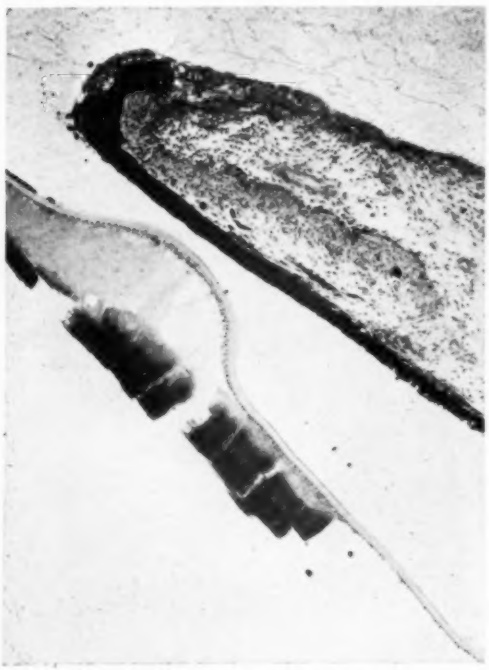

Fig. 2 (Finnoff). Nodule at pupillary margin on surface of pigmented epithelium.

Posterior synechiae and atrophic changes in pigment epithelium of the pupillary border are usually present in cases of long standing. In some cases the pigment of the stroma is absorbed and when only one eye is involved heterochromia iridis occurs.

Since in most cases of tuberculosis of the iris the ciliary body is involved, manifestations of cyclitis usually accompany the iritic process. Sero-fibrinous exudates and cells are found in the anterior chamber in varying quantities and the characteristic pale gray deposits on the posterior surface of the cornea, in the form of mutton fat deposits, accompany the iritis. These nonpigmented large deposits add weighty evidence in favor of a tuberculous etiology.

Chronic diffuse iritis may be associated with tuberculous scleritis. In some cases the cornea is also involved. This form is usually extremely chronic. It may last for years and terminate in dense white opacities in the cornea, thinning of the sclera and marked atrophy or sclerosis of the iris in addition to serious impairment of vision (Fig. 3, frontispiece).

2. In miliary tuberculosis of the iris grayish or yellowish red nodules appear in the iris stroma. They are usually situated either in the basal zone near the angle of the anterior chamber or near the pupil in the region of the minor arterial circle. They may, however, be seen in all zones. As has already been stated this form may be preceded by diffuse iritis in which nodules appear later. I have seen this occur many times

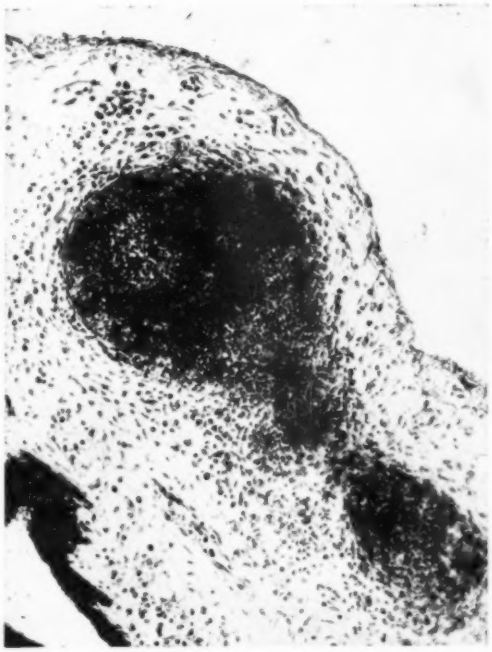

Fig. 4 (Finnoff). Early iris nodule in iris with little change in anterior layers of iris stroma.

in experimental animals and occasionally in human eyes. Other similar cases are on record.

In the mild type the nodules first appear as gray elevations of the iris surface with little change in the anterior border layer (Figs. 4 and 5). Later the pigment disappears and the nodule begins to protrude through the stroma (Fig. 6). In the more chronic cases the color changes gradually to yellow and blood vessels proliferate over the surface of the nodule. The nodules vary from 1 to 3 mm. in size. One or many such nodules may appear. The process may subside at any stage or the lesions may progress and become confluent when they pass into the conglomerate form. If the process subsides in the early stage, before the nodule has broken through the anterior border layer, the appearance of the iris may return to normal and leave no evidence of previous inflammation. When it progresses destruction of the mesodermal pigment of the anterior border layer occurs and atrophic spots in addition to minute scars can be found in the iris stroma. The process may go on to destruction of the pigment epithelium of the posterior layer of the iris and leave translucent areas that can be seen when the eyeball is transilluminated. Unless the ciliary body becomes involved or hemorrhages occur into the anterior chamber the whole process is attended with little or no pain.

This form is seen most often in diffuse miliary tuberculosis and the intraocular disease is rarely confined to the iris but involves the whole of the uveal tract. The patient usually dies before the disease has run its full course in the eye. The condition, however, may improve and relapse later. Samelsohn[60] reported such a case in a boy six years of age in whom the tubercles disappeared, but later reappeared with meningitis and death. When this type appears in young children it is generally a manifestation of generalized miliary tuberculosis and the prognosis for life is poor. In the few cases that recover,

Fig. 5 (Finnoff). Nodule in iris stroma slightly more advanced than in figure 4.

the eye either becomes blind and atrophic or the process continues until the eye ruptures, discharges its contents and shrinks.

Hemorrhages into the iris stroma and anterior chamber are often seen in the early stages of nodular tuberculous iritis. They may be slight and confined to the stroma in the region of the nodule or severe and fill the anterior chamber so that they obscure the iris picture. Secondary glaucoma may occur from blockage of the angle of the anterior

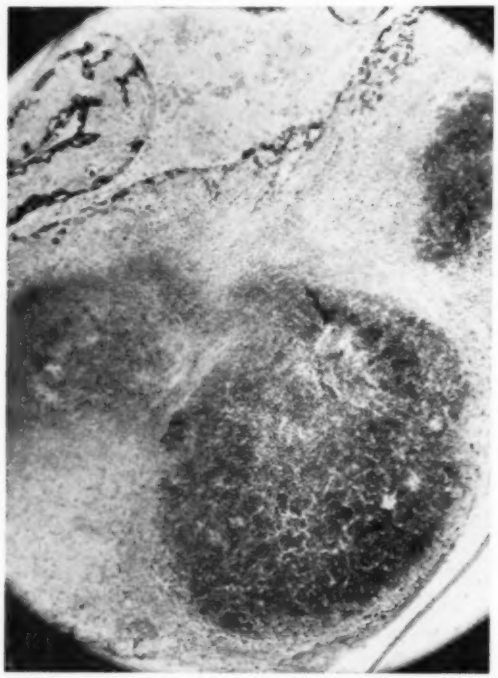

Fig. 6 (Finnoff). Beginning destruction of anterior border layer. Tubercle was visible to naked eye at this stage.

chamber. This complication was frequently encountered in experimental animals.

3. In the confluent or conglomerate form yellowish tumors appear on the surface of the iris at its base. They arise in the iris stroma and grow forward into the anterior chamber where they may invade the ligamentum pectinatum, then extend into the cornea and later the sclera at the limbus. Blood vessels soon appear and pass over the surface of the tubercle but do not penetrate its

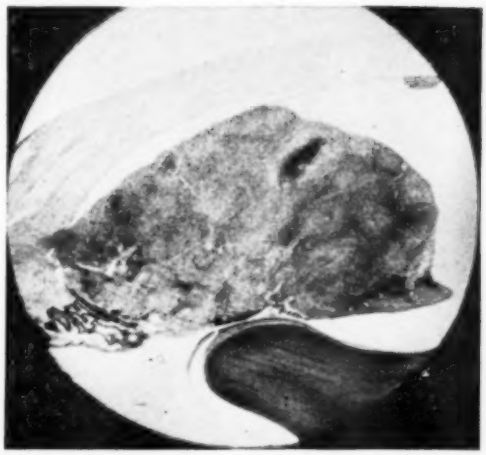

Fig. 7 (Finnoff). Massive tubercle of iris obstructing angle of anterior chamber.

substance. Smaller nodules occasionally surround the larger masses and may merge with them in progressive cases. One occasionally sees both miliary and confluent nodules in the same eye.

The lesions in the conglomerate form become massive and may be mistaken for malignant tumors. I have received several such eyes for microscopic examination in which the diagnosis of sarcoma had been made.

The masses are usually near the base of the iris and the angle of the anterior chamber is invaded early (Fig. 7). The cornea and sclera are often involved

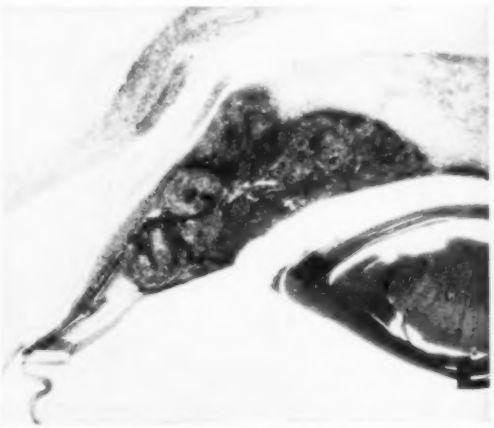

Fig. 8 (Finnoff). Massive tubercle of iris and ciliary body with involvement of cornea and sclera.

(Fig. 8) and perforation of the globe frequently ensues. However, the tubercle may be located in other portions of the iris. It may be in the pupillary region, become large and reach the posterior surface of the cornea, where Descemet's membrane may be destroyed and the substantia propria attacked (Figs. 9, 10).

A tuberculoma may increase in size and entirely fill the anterior chamber (Figs. 11, 12). The growth may be slow; it may remain stationary for a time, subside, eventually disappear, and leave a scarred atrophic iris in its wake; or

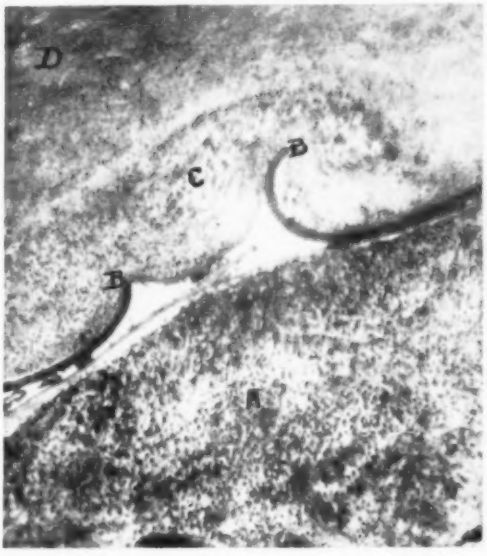

Fig. 9 (Finnoff). Tuberculosis of iris with destruction of Descemet's membrane and invasion of cornea. A. Tubercle in iris stroma. B. Edges of Descemet's membrane. C. Tubercle in cornea. D. Corneal stroma.

it may be quiet for several months and become active at a later time.

Serofibrinous exudates are usually present in the earlier stages and hemorrhages are frequently seen. The exudates are more conspicuous when the ciliary body is invaded in conjunction with the iris. Mutton fat deposits may be present on the posterior surface of the cornea (Fig. 13). Hemorrhages may also accompany massive tubercles. They may be large or small; they usually absorb rapidly and often recur. Hypopyon of caseous material has been

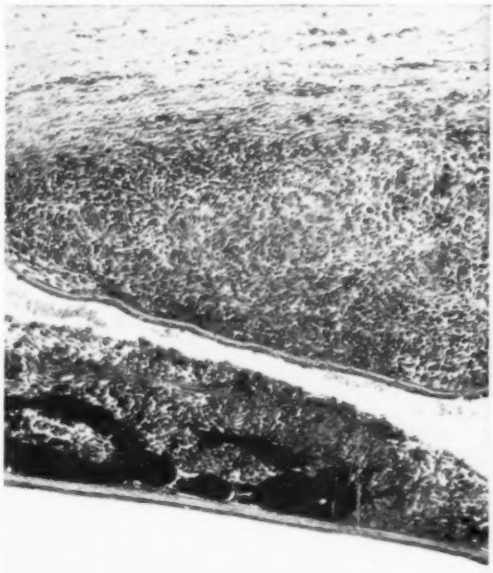

Fig. 10 (Finnoff). Tuberculosis of iris and invasion of cornea.

reported in cases of this type. I have seen it several times in experimental animals, but never in man.

The mildness of pain and other subjective symptoms are entirely out of keeping with the appearance of the lesions in the eye. When the angle of the anterior chamber is invaded interference with drainage may occur and secondary glaucoma intervene. This is attended with acute pain and the other symptoms of glaucoma.

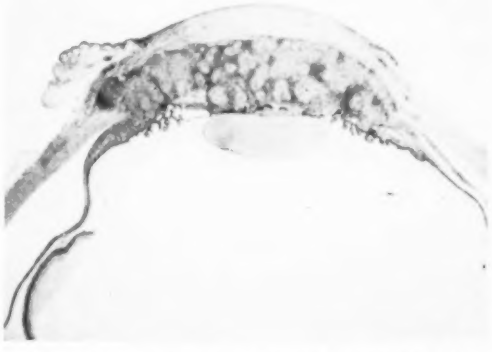

Fig. 11 (Finnoff). Tuberculoma of iris filling anterior chamber.

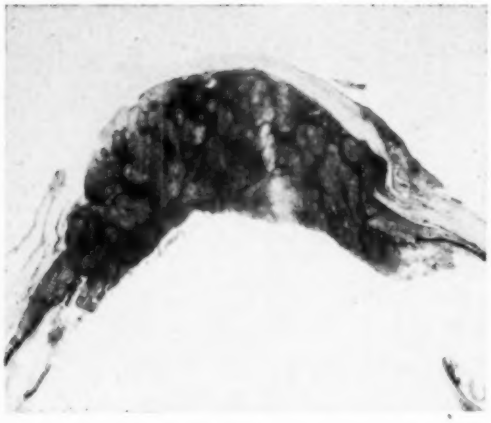

Fig. 12 (Finnoff). Tuberculoma of iris filling anterior chamber.

In the severe cases of this type enucleation is usually necessary either to relieve the pain of glaucoma or because of rupture of the globe. Many die from systemic tuberculosis before the ocular process has subsided.

Tuberculosis of the ciliary body

In my opinion tuberculosis of the ciliary body is a relatively common disease. I am convinced that it is rarely discovered in its earlier stage and frequently is only suspected when the inflammation has spread to other parts of the eye. From histological evidence I have come to the conclusion that the ciliary body is often the first site of a tuberculous infection in the eye and from there the disease spreads to the iris, retina, choroid, and sclera.

Verhoeff[61] and others have alluded to the importance of this portion of the eye as a starting point for other forms of ocular tuberculosis. Verhoeff followed the infection from this region forward via the posterior chamber, the pupil, anterior chamber, and through

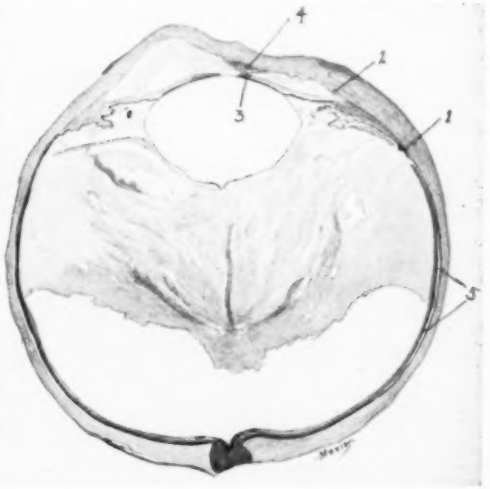

Fig. 14 (Finnoff). 1. Tubercle in pars plana of ciliary body (Fig. 15). 2. Metastatic focus in ligamentum pectinatum. 3. Metastatic focus in iris. 4. Beginning focus in cornea. 5. Extension backward in perivascular lymph spaces of retinal veins.

Fig. 13 (Finnoff). Mutton fat deposits on posterior surface of the cornea.

the angle of the anterior chamber to the scleral and episcleral tissue in the vicinity of the limbus. Meller traced the infection backward along the perivascular lymph spaces of the retinal veins. I have observed the same thing in several pathological eyes (Fig. 14). Further elaboration of this suggestion is contemplated in a future communication.

Tuberculosis of the ciliary body begins most often in the inner or vascular layer. It may also have as its starting point the perichoroidal lymph space that lies between the sclera and the radiating muscle. The muscular portion is rarely the primary seat of a ciliary

affection, but it is always invaded in advanced cases.

When the vascular region is affected it may begin in the pars plana, or in the corona ciliaris. In primary hematogenous infections it is my opinion that the pars plana is usually the first part of the ciliary body to be invaded. Here the vessels are smaller and bacterial emboli are more likely to lodge than in the widely dilated vessels of the ciliary processes. The ciliary processes are usually involved secondarily by the spreading forward of the tuberculous inflammation from lesions in the pars plana or by the extension backward from an affected area in the iris.

In the pars plana the lesions begin in the vascular layer that rests on the inner surface of the ciliary muscle. There may be several small scattered nodules just under the pigmented epithelium or larger masses that push inward destroying the epithelium and spread into the posterior chamber. Infectious material is then carried forward by the aqueous to the anterior chamber where it may be deposited on the iris and in the angle. Lymphocytes and plastic material are deposited on the posterior portion of the cornea and resemble drops of cold mutton fat (Fig. 13). The deposits may be few or many in number. They are usually seen in the lower portion of the cornea but may be seen in all parts. Bedewing of the endothelium is always seen between the deposits. Unless the deposits are of long standing they are conspicuous by the relative absence of pigment in their composition. The circumlental space may be filled with exudate and the ciliary processes and iris involved. Fibrinous exudates and cells invade the anterior vitreous which becomes hazy. The hyaloid, however, is rarely destroyed and the vitreous does not become involved in a tuberculous inflammation. In some cases tubercle bacilli are carried backward from the ciliary body to the perivascular lymph spaces that surround the retinal vessels (Figs. 22 and 23). There they set up a tuberculous perivasculitis and recurrent hemorrhages into the retina and vitreous occur after the vessel wall is eroded.

Fig. 15 (Finnoff). Tubercle in vascular layer of ciliary body. (See also Fig. 14.)

Fig. 16 (Finnoff). Tubercle bursting through ciliary epithelium and extending forward into posterior chamber.

Figure 14 is a drawing of a section of an eye in which there were tubercles in the ciliary body, from which the infection spread forward into the iris and cornea and backward into the retina. The bacilli were carried forward by the aqueous and the lymph transported them backward along the perivascular lymph spaces as far as the equator. The photomicrographs taken from sections of the eye show the original nodule in the ciliary body (Figs. 15, 16, and 17), in the iris, cornea (Figs. 9 and 10), and in the retina (Fig. 18).

Tuberculosis in the region of the pars plana produces mild symptoms and is easily overlooked. A few small mutton fat deposits on the posterior surface of the cornea may be the only sign. Since the exudate is of a cellular and plastic character the angle of the anterior chamber is easily blocked and hypertension, with its accompanying pain, drop in vision, etc., may supervene at any time. Therapeutic and operative measures often fail to relieve the glaucoma and enucleation is usually necessary. It is from this material that much of our knowledge of the nature of ciliary tuberculosis has been derived.

Tuberculosis in the perichoroidal space spreads forward without diffi-

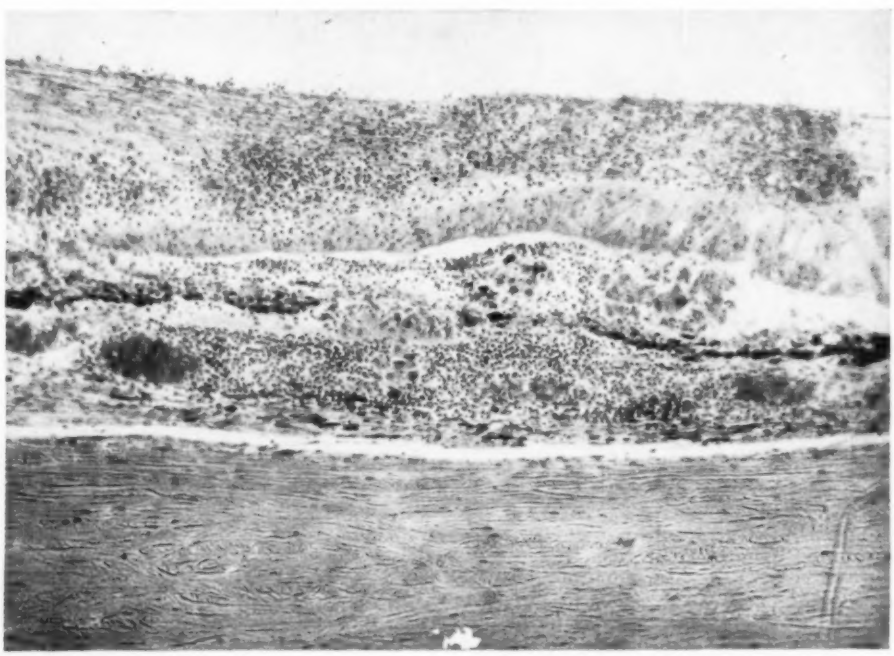

Fig. 17 (Finnoff). Extension into anterior chamber of tubercle of ciliary body.

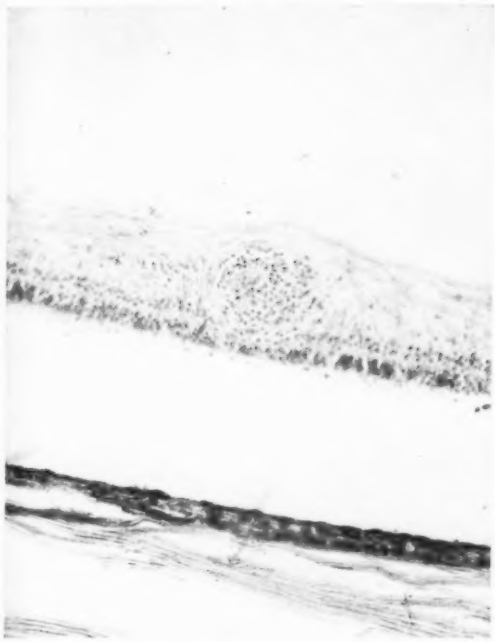

Fig. 18 (Finnoff). Tubercle of retinal vessel.

culty to the region of the scleral spur, from here its advances to the ligamentum pectinatum and base of the iris. It may also be carried backward toward the choroid or it may attack and destroy the sclera and spread to the episcleral tissue. (Fig. 25). When this occurs the symptoms of scleritis and episcleritis appear and the cornea may become involved later in a sclerosing keratitis. In some cases the posterior layers of the corneal stroma are invaded and Descemet's membrane pushed backward (Fig. 19). In severe cases the sclera may disintegrate and the eyeball rupture (Fig. 20).

The ciliary body and iris may be involved simultaneously and the whole anterior portion of the globe become filled with a massive tuberculous exudate (Figs. 11 and 12). This is seen most often in children.

Tuberculosis of the choroid

Three types of tuberculosis occur in the choroid. They are (1) the miliary, (2) the conglobate, and (3) the disseminate forms. The miliary may be divided into (a) the acute, and (b) the chronic.

1. (a) The acute miliary form is usually associated with acute miliary tuberculosis or tuberculous meningitis. It is characterized by the appearance of small grayish or yellowish round or oval nodules in the choroid near the posterior pole of the eyeball. The nodules vary in size from one-third to one disc diameter; occasionally they are larger. They are slightly elevated; the retinal vessels bulge as they pass over them. The edges are usually indistinct and fade gradually into the surrounding fundus. They occasionally occur singly (fig. 21), but usually several are found in the same eye. In one case, a boy two years of age, I counted twelve in one eye and sixteen in the other. Both eyes are involved in the majority of cases.

Most patients die shortly after the appearance of the choroidal nodules and for this reason little change occurs in the ophthalmoscopic appearance of the lesions. In rare instances caseation occurs and the tubercles become yellow or white in color; later minute pigment granules appear on the surface of the lesions and are gradually carried to the edges of the nodules by phagocytes.

Fig. 19 (Finnoff). Tuberculous kerat .

There they collect, forming dark borders. The centers become organized and form scar tissue. At this stage the tubercles are converted into brilliant white areas that are surrounded by pigment.

(b) Chronic multiple miliary tubercles of the choroid, without meningitis or generalized miliary tuberculosis, occur. This form of the disease is characterized by the presence of numerous small gray or yellowish, round and oval nodules in the choroid. In this type the lesions are not always located in the posterior pole but may be seen in the periphery of the fundus also. The disease is extremely chronic and is often

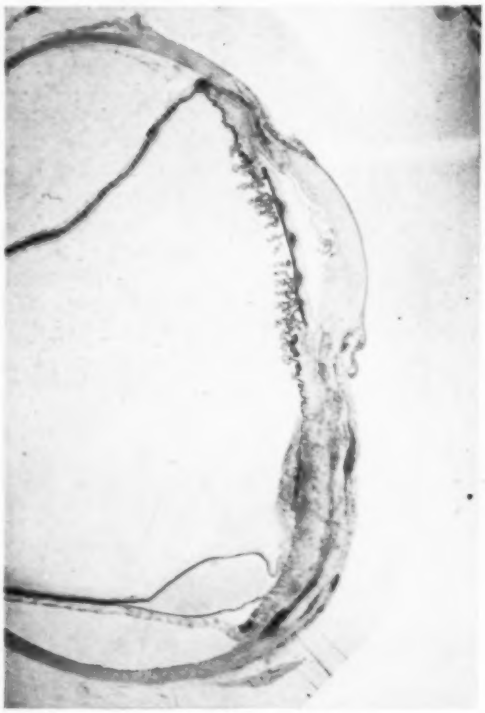

Fig. 20 (Finnoff). Tuberculosis of ciliary body and sclera.

confined to one eye. There is usually an accompanying cyclitis with small mutton-fat deposits on the posterior surface of the cornea. The vitreous is usually cloudy and filled with globular or diffuse massive exudates that obscure the fundus details. The tension often becomes elevated for long periods

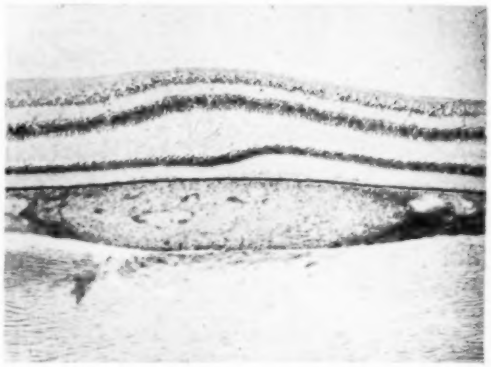

Fig. 21 (Finnoff). Miliary tubercle of choroid.

of time and resists all efforts to reduce it with myotics. Glaucosan and adrenalin occasionally control the tension when other measures fail. These eyes do badly after iridectomy or other operative procedures. This form of tuberculous uveitis is rarely mentioned in the textbooks.

2. Conglobate or solitary tubercle is a chronic form of choroidal tuberculosis, the lesion is a single large nodule that may resemble an intraocular tumor. The mass is usually located in the posterior pole and may be situated in the macula (Fig. 1). When located near the edge of the disc it may produce the ophthalmoscopic picture of choroiditis

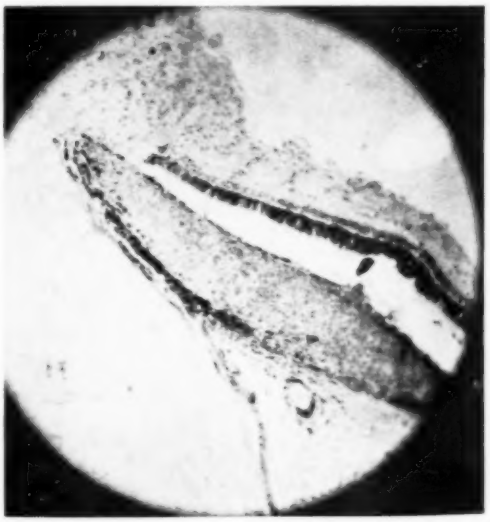

Fig. 22 (Finnoff). Tubercle of choroid at edge of optic nerve. Rabbit's eye.

juxta papillaris, or Jensen's retino-choroiditis (Fig. 22).

Conglobate tubercles involve the full thickness of the choroid from the sclera to the lamina vitrea. As the tubercle increases in size Bruch's membrane is destroyed and the pigmented epithelium and retina become included in the mass. The lesions are usually confined to one eye. In the early stage they are gray in color with indistinct edges. Later, when caseation occurs, they become yellow, then fine granules of pigment appear on the surface and at the edge of the lesion. These steps occur over a period of months and eventually subside with the formation of scar tissue that replaces the tuberculous mass. In severe cases the process may extend into the sclera and the eyeball may be perforated. In other cases the retina, choroid and a portion of the sclera are destroyed and a depressed scar follows. Often the retina becomes detached and the fundus details obliterated. During the active stage of a large solitary tubercle the vitreous is often cloudy and details of the fundus blurred. A mild anterior uveitis of a non-tuberculous character often accompanies massive tubercles of the choroid. In these cases small deposits occur on the posterior surface of the cornea and persist for long periods of time. One not infrequently sees collections of lymphocytes, without epithelioid cells or other microscopic evidence of tuberculosis, in the ciliary body and iris in microscopic sections of such eyeballs. Small hemorrhages into the retina at or near the edge of the nodule are seen often during the active stage. Extensive hemorrhages are rare and in my study of the literature I have been unable to find reports of cases of this type with hemorrhages into the vitreous.

Conglobate tubercles may heal and remain inactive throughout the remainder of the subject's life, or they may remain quiet for long periods of time and then break down and become active again. I have seen several such cases. Dr. Edward Jackson[62] reported such a case in a young woman, who had three relapses with extension. In most of the relapses the process began at the edge of the primary lesion in the form of a new nodule. In one of my cases four such relapses have occurred and the present scar presents a lobulated appearance with the original scar in the center (Fig. 23).

In cases with dense clouds in the vitreous the exudates may become organized into bands of scar tissue that persist through the remainder of the patient's life. They are frequently seen in eyes in which there are large choroidal scars.

3. The disseminated form of choroidal tuberculosis of the eye may simulate choroiditis from other causes. It is usually more chronic and shows a greater tendency to relapse than disseminated choroiditis due to other diseases. Unless definite tubercles develop one cannot be certain that the disease is tuberculosis. In a prolonged choroiditis with mutton-fat deposits on the cornea and after the exclusion of syphilis and sympathetic ophthalmia one might be justified in classifying certain cases as tuberculous. Occasionally one sees cases of this type in persons with active tuberculosis, in whom large conglobate tubercles appear in the choroid in the late stage of the ocular process.

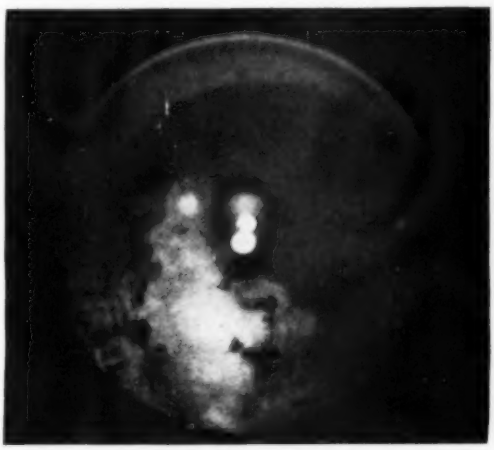

Fig. 23 (Finnoff). Lobulated tubercle of choroid. Central scar with pigmented border was site of original lesion. Upper and lower lobes represent sites of subsequent activity.

In one such case that came under my observation, large irregular, slightly elevated patches of chorio-retinitis of a dirty gray color, were observed in the fundus. The patches suggested colonies of mould and occupied the greater portion of the fundus of both eyes. The vitreous was hazy and a few mutton-fat deposits were present on the posterior surface of the cornea. This condition persisted for several months without marked change, when a large yellowish nodule appeared in the macular region of the right eye, in addition to the diffuse exudates in the fundus. The nodule resembled a conglobate tubercle. The vitreous exudates increased and became so dense that the fundus could barely be seen. At the same time the patient's general condition became worse and she passed from my observation when she left the sanitarium to return to her home to die.

In Adams' atlas on the fundus oculi, there is an illustration of a similar case but without the conglobate tubercle. Such fulminating cases are probably rare.

Conclusions

1. Chronic uveitis is frequently of tuberculous origin.

2. Most cases of tuberculous uveitis are characterized by the formation of nodules.

3. In the diffuse forms, without the presence of nodules, it is difficult or impossible to make a differential diagnosis between the tuberculous and other forms of uveitis from clinical data and symptoms. In these cases only animal inoculations or microscopic examination of the affected tissue gives positive evidence.

4. All parts of the uveal tract are vulnerable to tuberculous infection.

5. The percentage of cases of chronic uveitis that are due to tuberculosis cannot be accurately estimated from a study of the literature.

6. Tuberculosis is more often the cause of chronic uveitis in persons under 25 years of age than in later life.

7. The symptoms of chronic tuberculous uveitis may be closely simulated by syphilis and sympathetic ophthalmia.

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Bibliography

[1] Maitre-Jan, A. Traité des maladies de l'œil. Troyes, 1707, p. 456.
[2] Autenrieth, J. F. H. Versuche für die praktische Heilkunde aus den clinischen Anstalten von Tübingen, 1807, v. 1, p. 309.
[3] Saunders, J. C. Treatise on some practical points relating to diseases of the eye. London, 1811, p. 119.
[4] Demours, A. P. Traité des maladies des yeux. Paris, 1818, 3 vols.
[5] Delarue, F. de. Excroissances charnues de l'iris. Cours complet des maladies des yeux. Paris, 1820, p. 206.
[6] Ritterich, F. P. Jährliche Beiträge zur Vervollkommnung der Augenheilkunst. Leipzig, 1827, v. 1, p. 37.
[7] Lawrence, W. Treatise on diseases of the eye. London, 1833, p. 593.
[8] Lincke, C. G. De fungo medullari oculi. Leipzig, 1833, pt. 1, pp. 52-80.
[9] Mackenzie, W. Practical treatise on the diseases of the eye. 4th edition, 1854, p. 705.
[10] Jaeger, C. F. Ueber Markschwamm des Auges und amaurotisches Katzenauge. Wurzburg, 1831, p. 78.
[11] de Mussy, H. 1837.
[12] Jaeger, E. Ueber Choridealtuberkel. Oesterr. Zeitschr. f. prakt. Heilkunde, 1855, v. 2, pp. 9-10.
[13] Manz, W. E. Tuberculose der Choroidea. Arch. f. Ophth., 1858, v. 4, pt. 2, pp. 120-126; Ann. d'Ocul., 1861, v. 45, p. 179 (abstract).
[14] Cohnheim, J. Ueber Tuberculose der Choroidea. Virchow's Arch. f. path. Anat., 1867, v. 39, pp. 49-69.
———.Ueber Tuberculose der Aderhaut. Berl. klin. Woch., 1867, v. 4, pp. 63-64.
———. Case report before Berlin Medical Society, 1867, June 19. Berl. klin. Woch., 1867, v. 4, p. 324.
[15] Waldenburg, L. Tuberculose, die Lungenschwindsucht und Scrofulose, nach historischen und experimentellen Studien. Verlag von August Hirschwald. Berlin, 1869.
[16] Galezowski, X. Arch. f. Ophth., 1865.
[17] Bouchut, E. Du diagnostic des maladies du système nerveux par l'ophtalmoscopie. Gaz. d. hôp., Paris, 1866, p. 225.

[15] Graefe, E., and Leber, T. Ueber Aderhauttuberkel. Arch. f. Ophth., v. 14, pt. 1, pp. 183-206.
[19] Poncet, F. Choroïde tuberculeuse. Gaz. méd. de Paris, 1875, v. 4, pp. 81; 93.
[20] Wells, J. Soelberg. Tubercle of the choroid diagnosed during life. Trans. Path. Soc., London, 1868, v. 19, pp. 359-361.
[21] Gradenigo, P. N. Iris tuberculeuse avec examen histologique. Gior. Ital. d'Oft., 1869-1870, p. 117.
[22] Berthold, H. and others. Trois cas de phthisie du bulbe à la suite de sarcôme choroïdien mélanotique. Ann. d'Ocul., 1871, v. 66, pp. 87-88.
[23] Parinaud, H. Tuberculose primitive de l'œil. Bull. Soc. de Chir., 1879, pp. 577; 602-611.
[24] Saltini, G. Un caso di neoplasia dell'iride. Ann. di Ottal., 1875, v. 4, pp. 127-131.
[25] Manfredi, N. Contribuzione clinica e anatomo-patologica alla tuberculosi oculare. Ann. di Ottal., Milan, 1875, v. 4, pp. 265-314.
[26] Weiss, L. Ueber Tuberkulose des Auges. Graefe's Arch. f. Ophth., 1877, v. 23, pt. 4, pp. 57-158.
[27] Haab, O. Die Tuberkulose des Auges. Arch. f. Ophth., 1879, v. 25, pt. 4, p. 163.
[28] Poncet, F. Tuberculose primitive de l'iris et du corps vitré. Gaz. d. hôp., Paris, 1882; also Gaz. d'Opht., Paris, v. 4, pp. 488-491.
[29] Koch, Robert. Die Aetiologie der Tuberculose. Berl. klin. Woch., 1882, v. 19, pp. 221-230.
[30] Haab, O. Weitere Mitteilungen über die Tuberculose des Auges. Klin. M. f. Augen., 1884, v. 22, pt. 3, pp. 391-402.
[31] Reissman, J. Ein Fall von tuberkuloser Choroiditis mit spontaner Perforation der Sclera in das subkonjunktivales Gewebe. Arch. f. Ophth., 1884, v. 30, pt. 3, p. 251.
[32] Wadsworth, O. F. A case of tuberculosis of ciliary body and iris. Trans. Amer. Ophth. Soc., 1880-1884, pp. 474-478.
———. Tubercle of choroid in acute miliary tuberculosis. Boston Med. and Surg. Jour., 1871, v. 84, p. 22.
[33] Lawford, J. B. Tubercle of the choroid; demonstration of the bacillus Koch in the tuberculous nodules. Trans. Ophth. Soc. United Kingdom, 1886, v. 6, pp. 348-354.
[34] Michel, J. Zur Kenntnis der Ursachen einer primären Iritis auf Grund einer statistischen Zusammenstellung. Münch. med. Woch., 1900, v. 47, pp. 853-855.
[35] Parinaud, H. Tuberculose primitive de l'œil. Bull. et Mém. Soc. de Chir. de Paris, 1879, n. s. 5, pp. 602-611; also (abstract) Gaz. d'Opht., Paris, 1879, pp. 118-120.
[36] Terson, A. Tuberculose oculaire; suites très éloignées de l'excision d'un tubercule irien. Ann. d'Ocul., 1904, pp. 119-129.
[37] Poncet, F. Note sur un cas de sarcôme de la choroïde; glaucome; décollement pédiculé de la rétine. Rec. d'Opht., Paris, 1888, 3 s, v. 10, pp. 577-587.
[38] Hirschberg, J. Zur Prognose des Aderhautsarkom. Arch. f. Path. Anat., etc., Berlinfi 1882, v. 90, pp. 1-25.
[39] Denig, R. Ueber die Häufigkeit der Lokaltuberkulose des Auges. Arch. f. Augenh., 1895, v. 31, pp. 359-393.
[40] de Wecker, L. Aetiologie der Iritis im Allgemeinen. Handbuch d. ges. Augenh., 1876, v. 4, p. 504.
[41] Fuchs, E. Lehrbuch der Augenheilkunde, 11th ed., Leipzig, 1891.
———. Der Iris, Klin. med. Woch., May 25; Ann. d'Ocul., 1888, p. 196.
[42] Leber, T. Ueber abgeschwächte Tuberkulose des Auges. 21 Ophth. Gesell., Heidelberg, 1891, pp. 44-46.
[43] Axenfeld, T. Solitäre Tuberkulose der Aderhaut. Med. Klin., Berlin, 1905, v. 1, pp. 375-377; die Bakteriologie des Auges. Fischer, Jena, 1907.
[44] Friedrich, P. L., and Nosske, H. Localisirung des Tuberkelbacillus. Ziegler's Beiträge, Jena, 1899, v. 26, pp. 470-510.
[45] Lagrange, Félix. Observation de tuberculose primitive du corps ciliaire et de l'iris. Arch. d'Opht., 1895, v. 15, pp. 170-175.
———. Étiologie, évolution et traitement de la tuberculose de l'iris. Bull. et Mém. Soç. Franç. d'Opht., 1898, v. 16, pp. 88-122.
———. Tuberculose de l'iris. Soc. de Méd. et de Chir. de Bordeaux, 1906, and Rev. Gén. d'Opht., 1906.
[46] Rollet, E. T., and Aurand, L. Recherches expérimentales sur les infections de la choroïde. Rev. Gén. d'Opht., 1908, Paris, v. 27, pp. 1-15.
[47] Stock, W. Pathologisch-anatomische Untersuchungen über experimentelle endogene Tuberkulose der Augen beim Kaninchen. Klin. M. f. Augenh., 1903, v. 41, p. 17.
[48] Finnoff, William C. Ocular tuberculosis, experimental and clinical. Arch. of Ophth., 1924, v. 53, pp. 130-136.
[49] Koch, R. Weitere Mittheilungen über ein Heilmittel gegen Tuberculose. Deutsche med. Woch., 1890, no. 56, p. 5.
[50] Leber, T. Ueber abgeschwächte Tuberkulose des Auges. 21 Ophth. Gesell., Heidelberg, 1891, pp. 44-46.
[51] Hippel, A. Ueber den Nutzen der Tuberculin bei der Tuberkulose des Auges. Graefe's Arch., 1904, v. 49, pp. 1-30; Ophth. Gesell., Heidelberg, 1905.

———. Ergebnisse der Tuberkulinbehandlung bei der Tuberkulose des Auges. Arch. f. Ophth., 1914, v. 87, pp. 194-225.
[52] Dor, L. Guérison de la tuberculose oculaire par la tuberculine. Lyon Méd., 1909, v. 112, pp. 760-763.
———. Tuberculose inflammatoire de lœil traitée par la tuberculine. Soc. des Yeux, 1906, v. 107, pp. 853-857.
———. Des tuberculines T. R., B. E., T. B. K. et de leur action curative puissante sur les tuberculoses, les tuberculides, et les tubercules oculaires. Clin. Opht., 1909, pp. 165; 227-240.
———. Tuberculinothérapie de la tuberculose. Clin. Opht., 1912, v. 18, pp. 63-68.
[53] Darier, A. Les tuberculines en thérapeutique oculaire. Clin. Opht., 1912, pp. 394-402.
———. Traité complet de thérapeutique oculaire. Jouve et Cie., Paris, 1921, p. 80.
[54] Hänsell, Paul. Beiträge zur Lehre von Tuberkulose der Iris, Cornea und Conjunctiva nach Impfversuchen an Thieren und klinischen Beobachtungen am Menschen. Arch. f. Ophth., 1879, v. 25, pt. 4, pp. 1-62.
[55] O'Gilvy, Alexander. Microscopic section from a case of tuberculous iridocyclitis in a man of 75 years. Trans. Ophth. Soc. United Kingdom, 1909, v. 29, p. 8.
[56] Griffith, A. Hill. Case of tuberculosis of the iris. Trans. Ophth. Soc. United Kingdom, 1890, v. 10, pp. 84-94.
[57] Péchin, A. Tuberculose de l'iris et du corps ciliaire. Arch. d'Opht., Paris, 1899, v. 19, pp. 696-723.
[58] Jacqueau et Bujadoux. Tuberculose irienne. Soc. d'Opht. de Lyon, 1924, v. 134, p. 96.
[59] Gilbert, W. Ueber intraokulare Tuberculose. Münch. med. Woch., 1914, v. 61, pp. 306-307.
———. Ueber tuberkulöse Gefässhautenzündung. Ophth. Gesell., Heidelberg, 1918, p. 16.
[60] Samelsohn, J. Ueber sogenannte abgeschwächte Iristuberculose. Ophth. Gesell., Heidelberg, 1893, v. 23, pp. 75-94.
[61] Verhoeff, F. Histologic findings in tubercular cyclitis. Trans. Amer. Ophth. Soc., 1910, v. 12, pt. 2, pp. 560-566.
[62] Jackson, Edward. Chronic tuberculosis of the choroid. Contributions to medical and biological research, dedicated to Dr. William Osler, 1919, v. 1, p. 616.

Discussion: DR. VERHOEFF: I would like to ask if this massive tuberculosis of the iris is something in which one can find tubercle bacilli. Do those cases belong in the same category as the cases in which the lesions are very small and never go into caseation? What of these other cases in which caseation is rare? Do you regard them as similar or do you think they are distinctive conditions?

DR. FINNOFF: I feel that they do not belong in the same category, that it is possible that the large massive tubercles are due to organisms that vary in virulence; that certain degrees of virulence will determine the size of the lesions and determine their chronicity. In the acute miliary form we are dealing with a more virulent type. In these large caseous forms the virulence of the organisms is probably attenuated somewhat. We see them frequently in children who later develop generalized tuberculosis and die of that, while in some of the chronic smaller lesions the virulence of the particular organism is less than it is in the acute miliary type.

DR. DERBY: Can you quote a percentage on that as a cause?

DR. FINNOFF: After carefully studying the literature I have come to the conclusion that it is impossible to arrive at an estimate of the frequency with which it occurs. My impression is, from analyzing cases of uveitis which I have seen, that tuberculosis is possibly a cause in from five to seven percent of the cases of chronic uveitis.

DR. EDWARD BROWN: Would you use tuberculin therapeutically in cases where chest pictures indicate an active pulmonary process?

DR. FINNOFF: I feel that that question is beside the point. The subject under discussion is tuberculosis as a cause of chronic uveitis. Personally, I should not use tuberculin in an active case of pulmonary tuberculosis.

DR. DE SCHWEINITZ: Given a case of chronic uveitis in which other factors may be eliminated, and with a positive tuberculin reaction, are we justified in using tuberculin?

DR. FINNOFF: That, again, is discussing therapeutics. I think that we are

justified in using tuberculin. There is a difference of opinion as to the value of tuberculin and one might get as many answers as questions asked in that regard.

DR. KREBS: What percentage of cases of tuberculous uveitis result in phthisis bulbi?

DR. FINNOFF: That is a difficult question to answer. Again, it would be difficult to know whether the reported cases in the literature were actually tuberculous or not. One could only make such an estimate from one's own cases. The number of cases that I have seen has been so small that it would be impossible to give you an intelligent answer to that question.

DR. HOLLOWAY: At times one sees in these chronic uveitis cases large round corpuscular fibrinous opacities that seem to adhere to a membrane. Do you agree with me that these are more prevalent in the tuberculous than in other types of uveitis?

DR. FINNOFF: I think that they are. I have seen three cases that I recall in which the exudates in the vitreous were round, larger than the average, and almost white in color. The subsequent developments convinced me that all of those cases were tuberculous in character. I think it is an important diagnostic point.

DR. VERHOEFF: Except in cases of caseation with destruction of the eye have you been able to demonstrate bacilli either by staining or by animal inoculation?

DR. FINNOFF: In only one case was I able, in chronic iritis, following iridectomy, to demonstrate tubercle bacilli in the tissue that was removed. In one of the sections of the ciliary body with the small tubercle that was shown on the screen, tubercle bacilli were demonstrated in the lesion, but only a few of them were found. It was only after examining sixty or seventy specimens that the tubercle bacilli were found. The eye was sectioned in series. They were not found in other cases. I have seen such lesions occur repeatedly in rabbits after the injection of tubercle bacilli in small quantities into the arterial circulation. There, of course, the organisms could have been demonstrated soon after the beginning of the lesions.

DR. VERHOEFF: You didn't get it by animal inoculation? You never induced it in that way?

DR. FINNOFF: Not after iridectomy. I feel quite sure there was nothing wrong in the technique because the specimen had been depigmented before. Dr. Feingold also identified the tubercle bacillus in that specimen.

THE ETIOLOGY OF CHRONIC IRITIS

ERNEST E. IRONS, M.D.
CHICAGO

Necessity for distinction between acute, recurrent, and chronic iritis in studying etiology is pointed out. The relative prevalence of diseases in populace from which cases come is to be considered. There is evidence that chronic and recurrent iritis may be allergic. In the small series of cases reported here there is higher incidence of tuberculosis as probable cause in chronic than acute or recurrent iritis. History and evidence of past or present tuberculosis elsewhere in the body do not alone prove this to be the etiology. Read in a symposium on chronic uveitis at the second meeting of the Association for Research in Ophthalmology, Philadelphia, June 9, 1931.

Studies of iritis, including those which Dr. E. V. L. Brown and I reported, have usually comprised all cases of iritis, without distinction as to their clinical course, and, insofar as there may be differences in etiology of acute, recurrent, and chronic iritis, these studies have failed to afford maximum information and clinical guidance. Other discrepancies as to apparent etiology have also appeared between series of cases reported from different localities and countries. These differences have concerned causes such as syphilis, chronic local infections, and especially tuberculosis.

Before reporting a small series of cases which illustrate some of the problems met by the internist in his coöperation with the ophthalmologist in the study of iritis, I wish to refer to the question of definition of chronic iritis, to the importance of differences in general background of disease in different communities, and to the theories of the mechanism of production of iritis.

Definition of chronic iritis

In attempting this study, I asked for a definition of chronic iritis, in order that all cases to be included in the study might be classified in advance of any attempt to determine possible differences in etiology. It turned out that this question was not so simple as it seemed to be at the outset, and after much discussion of definitions based on anatomic and clinical grounds, the cases were finally classified as chronic, if they had persisted for three months or longer. In using this basis of classification I am following the direction of my ophthalmologic colleagues, to whose advice and judgment concerning all ophthalmologic questions I defer in this discussion.

While many cases of iritis viewed in retrospect are easily seen to have been acute, recurrent, or chronic, and to have differed in their clinical course as to severity, or type of exudate, much of this information is not available at the onset of the disease, and in spite of the clinical appearances of the eye which may allow the making of an etiologic diagnosis in some cases, or of the probabilities of certain cases of acute or chronic course being due to one or another type of infection there seem to be many cases in which a helpful relation between chronicity and etiology is not evident. This raises the question as to whether a clinical division into acute and chronic may be as useful as we might hope. It may, however, serve to indicate trends of etiology even if it does not allow of far-reaching conclusions.

We meet with similar situations in other fields of medicine. Gonococcal arthritis is often acute, and may heal with no residual joint change, or there may be extensive adhesions which require months of treatment before serviceable function of the joint, or tendon, is obtained. In other cases the gonococcal arthritis recurs or persists for months, with damage to cartilage, so that in extreme cases, the clinical result is that of advanced proliferative, or deforming, arthritis. In still other cases there is proliferation of bone with the production of a rigid, immovable spine. All of these clinical results have been produced by one organism, the gonococcus, the differences in clinical

outcome depending on the reactions of the tissues of the host. The quality of the soil as well as of the seed determines the growth of the plant.

The possibility of differences in response in the tissues of the eye to the same cause deserves consideration, and argues for caution in assuming one or another etiology on the basis of acuity or chronicity alone.

The background of disease

Studies of iritis of the past twenty years have added much to knowledge of its etiology, but have developed at the same time discrepancies between opinions which are both puzzling and disturbing. The student of clinical medicine, like the observer in the laboratory, can report only what he has observed. The value of his report depends on the care and intelligence used in making his observations. When reports are at variance it is necessary to inquire not only as to individual technique but as to fundamental differences in clinical material.

The importance of the prevalence of diseases in the general population from which the cases of a series of observations come is well shown in relation to some diseases, and deserves earnest consideration in others in which the relation of cause and effect is not so clear.

Dr. Brown and I found syphilis as a cause of iritis in 19 percent, and in 1,234 collected cases reported last year by Gifford the percentage was 19.8 percent. Other American reports, notably one from Baltimore and one from New Orleans, gave much higher figures. Both reports indicate that among the patients was a high proportion of negroes, in whom in these communities syphilis is prevalent. In the New Orleans series, the total colored attendance in the clinic was not over 40 percent of the total attendance, but of 109 cases of iritis in 1920, 83 were colored and in 1921, of 93 cases, 75 were colored. The question of percentage of syphilis as a cause of iritis is not raised here for controversial purpose, but to point out that the source of the material upon which statistics are based must be considered in their interpretation. Whatever other infections may have been present in the New Orleans series, the fact remains that the percentage of positive Wassermann tests varied between 56 and 76 percent, a figure much higher than in most other series.

Again the proportion of chronic unrecognized or neglected infections of teeth, tonsils, and prostate, as well as of untreated or inadequately treated syphilis, is likely to be higher in dispensary clinics than in private practice. Syphilis and chronic gonococcal infections are often found together. Our first series of 1916, included about half dispensary and half private patients, while the second series came chiefly from private sources. The percentage of syphilis as well as of combined and multiple infections was higher in the former than in the latter group.

The obvious explanation of such differences in statistics lies in differences in sources of material, which in New Orleans was derived from a dispensary clinic, with a high proportion of colored patients among whom syphilis was prevalent. It has also been shown that the incidence of iritis in colored subjects of syphilis is about twice that in a similar white syphilitic group.

Another excellent example of the effect of the background of disease is found in relapsing fever, in which iritis is caused by the spirochete of the disease in natural epidemics and in a notable number of cases in which recurrent fever is artificially produced for therapeutic purposes in patients with dementia paralytica. The percentages of the several causes in a series of cases of iritis studied in a community in which recurrent fever was epidemic would from this fact alone differ from percentages in a series in the same community in the absence of a recurrent fever epidemic.

The incidence of latent tuberculosis in a given population will affect the proportion of cases which will yield minimal clinical evidence of tuberculosis, and therefore the proportion of cases of iritis in which tuberculosis must be entertained as a possible cause.

Krohnfeld (P. Krohnfeld—Deutsche Medicinische Gesellschaft—1931—Chicago) has recently shown that differences between American and German statistics originate in part at least in the relative incidence of tuberculosis, in different localities, and has further suggested that when one disease overshadows others in frequency of recognition, there is always a tendency to classify doubtful cases in the prevalent, better known group. This applies to American studies in which chronic local infections have been emphasized, as well as to German clinics in which tuberculosis has received more attention.

A careful reading of papers such as those of Frisch and Pillat, of Urbanek, and of R. Braun, who disputes the conclusions of Frisch and Pillat as to the clinical superiority of the Mantoux over the v. Pirquet test, suggests that the percentage of cases in which clinical tuberculosis was evidently present, no matter whether it was the cause of the iritis, was higher in these clinics than in American series. Greater care in the search for minimal evidences of tuberculosis in history, physical examination and especially by x-ray films of the lungs will no doubt increase the number of American cases in which traces of tuberculosis, which may or may not be significant in etiology, will be found.

Mechanism of iritis

Some of the facts concerning the mechanism of iritis were discussed last year, especially in the admirable paper by Kolmer. The obvious difficulties in accounting for recurrent iritis solely on the basis of embolic bacterial lodgment in the uveal tract were well shown, and the discussion suggested that phenomena of sensitization as well as actual bacterial lodgment are involved. The original invasion may be, and in certain infections in man and in experimental animals has been shown to be due to actual bacterial lodgment, and organisms have been recovered from the affected eye. Subsequent recurrences in recovered eyes may of course be due to recurrent bacterial lodgment although the theory of probabilities may well be urged against this.

In acute endogenous, non-recurrent iritis the conception of fortuitous embolic bacterial lodgment seems to offer one reasonable explanation of the production of the lesion by organisms, resident elsewhere in the body, and transported by the blood stream in the course of a bacteremia. This bacteremia may be demonstrable by culture as in sepsis, or in meningococcal infections, to employ examples of diseases in which the invading organism has been found in the ocular lesion, or may be almost symptomless as in acute iritis, in cases which seem clearly to be due to focal infection. The apparent natural resistance of tissues of the eye, suggested by the absence of symptoms of ocular lesions in many, and indeed the majority of cases of known sepsis and other bacteremias, is not peculiar to the eye but is also shared by other tissues of the body, in which there is frequently no evidence of metastatic lesion. In many diseases such as lobar pneumonia, typhoid fever sepsis, or osteomyelitis originating in a furuncle, in which there is a transport of organisms by the blood stream, the striking fact is not that a lesion in joint or bone or eye should be produced, but rather that considering the extent of the bacteremia so few metastatic lesions should be caused.

Bactericidal action of fluids and tissues of the body, and the peculiarities of special organs which result in variations in blood supply and oxygen tension, undoubtedly are among the factors which determine the survival of the invading organism, and the presence or absence of a metastatic lesion. Then, too, different organisms and different strains of closely related organisms have varying growth requirements, and in response to varying environment, produce different changes in media in which they grow.

In consideration of the relatively few symptom-producing metastases observed in diseases with known bacteremias, we should reasonably expect that

Table 1

ACUTE IRITIS

No.	Age Sex	Infections found	Evidence of Tuberculosis					Remarks
			History	Physical	X-Ray Chest	von Pirquet	O.T. Subcut.	
6910 S	33 M	Alveolar abscess	0	0		Slight +	0 5 mg.	
7569 N	34 F	Ac. tonsillitis Erythema nodosum	0	0	0 exc. 3–4 Calc. hilum glds.	0	0 4 mg.	
3943 Y	56 M	Chr. tonsillitis Chr. prostatitis	0	0	–	–	0 3 mg.	Recovered. Prostatic massage Tonsillectomy
7662 C	41 M	Chr. prostatitis	0 1 sister d. 25 yrs. ago Tbc.	0	–	Slight +	0 to 3 mg. Slight +5 mg.	Recovered 1 Mo. Chr. arthritis
7232 J	44 F	Sinusitis	0	0	0	0	0 2 & 4 mg.	Chr. arthritis
6810 S	30 M	Chr. prostatitis Recurrent pharyngitis	0	0	0	0	0 4 mg.	Recovered. Prostatic massage
3701 B	61 M	Syphilis. Chr. prostatitis. Chr. tonsillitis	0	0	0 Calc. glds. hilum	+	+ 3 mg.	Recovered. Antiluetic and prostatic treatment

in local infections with minimal and usually undemonstrable bacteremia, instances of metastasis in the uveal tract would be unusual and we are, therefore, prepared to note without surprise the relative rarity of iritis compared to the frequency of chronic local infections. The same argument seems to apply with perhaps still more force in some other diseases such as tuberculosis.

Sensitization

Recurrences of iritis in the same eye, and the exacerbations of chronic iritis, however, raise questions which do not seem well answered by a limitation of the mechanism to bacterial lodgment. While it is probable that tissues of the eye previously injured are more susceptible to bacterial reinvasion, it is also possible that the exacerbations of irritation may be due to bacterial toxins generated in the original or other focus, which excite a reaction in the uveal tract already specifically sensitized by the first attack. The removal of a focus of infection such as a tonsillar abscess would be effective in preventing recurrences, whether the actual exciting cause originating in the tonsil and acting on the sensitized eye were the bacterial body or its toxin.

The rôle of allergy in diseases of the eye has been widely discussed especially in sympathetic ophthalmia by many ophthalmologists since the paper of Pusey in 1903—(Pusey, Brown. Archives of Ophthalmology, 1903, v. 32, p. 334)—but in recent years in the study of iritis, attention has been directed chiefly to the bacterial invaders rather than to the allergic state to which infection may give rise. With a fuller experimental and clinical knowl-

Table 2

RECURRENT IRITIS

No.	Age Sex	Evidence of Tuberculosis: Infections found	History	Physical	X-Ray Chest	von Pirquet	O.T. Subcut.	Remarks
4095 B	30 F	Chr. tonsillitis Sinus maxillary	0	0	–	0	Slight local 3 mg.	
4138 F	39 M	Chr. prostatitis	0	0	–	Slight	Slight local 3 mg.	Recurred with prostatitis
4966 S	40 F	None found	0	0	–	–	0 1, 3, 4, mg.	
7331 TS	35 F Col	Chr. tonsillitis Old gonococcal inf. Arthritis Tuberculosis?	0	0	–	+	+ 3 mg. local focal?	
3032 ST	50 M	Chr. prostatitis	0	0	0	0		
3658 H	4½ F	Chr. tonsillitis Pyuria	0	0	0	0	–	
4084 B	46 M	Chr. tonsillitis Alv. abscess	0	0	–	+ Slight	Slight local 2 mg.	
7523 J	58 F Col	Tuberculosis	+	0	+ Healed? l. apex	+	+ 3 mg.	
5664 C	32 M	Chr. prostatitis Recurrences after acute colds	0	0	0	0	0 3 mg.	Chr. arthritis
6114 B	42 M	Chr. prostatitis Recurrence after pharyngitis	0	0	0 0 after 4 years	0	0	

edge of the bacterial factors in iritis, it may be possible better to evaluate and understand the part which toxins, and other bacterial products, play in the clinical course of the disease. This can be attempted more safely now than in former years when theories of toxins and their actions were perhaps more vague than at present. To attempt a discussion of this topic now is neither appropriate nor possible, but an inquiry into the etiology of iritis quickly brings out clinical facts which do not seem explicable on the basis of bacterial lodgment alone.

Now and then the removal of the tonsils or the extraction of an infected tooth is followed within a few hours by the sudden subsidence of symptoms and disappearance of inflammation in an eye in which acute inflammation of the uveal tract is present. The same amelioration of symptoms occasionally follows the injection of foreign protein. When tuberculin is given subcutaneously in sufficient dosage a focal reaction may occur in the affected eye with increase in symptoms and signs of inflammation. These common and well known observations suggest that

Table 3

CHRONIC IRITIS

No.	Age Sex	Evidence of Tuberculosis: Infections found	History	Physical	X-Ray Chest	von Pirquet	O.T. Subcut.	Remarks
4087 R	34 F	Chr. tonsillar abscess. Old syphilis. Wass.— Pleurisy	0	0 at onset. Later Pleurisy	—	0	0 2 mg.	Possibly tuberculous pleurisy
4743 M	21 M	No clear cause Small cervical glands	0	0	0	0	0 2 mg.	
5579 W	42 M	Chr. prostatitis	0	0	0	0	0 2 & 5 mg.	
5748 de L	30 F	Chr. sinusitis Alveolar abscess Recurrent pharyngitis	0 father d. Tbc.	0	0	+	0 2 mg.	Recovered
6076 P	29 M	Syphilis, Wass.— Kahn—Chr.tonsillitis. Tuberculosis	Glands neck at 10 yrs.	0 Exc. scars	+ Minimal	+	+ 2 mg.	
6579 O	51 F	Tuberculosis?	0	0	Calc. nodules near hila	+	0 5 mg.	In Vienna diag. tuberculosis 20 inj. B.E.
5944 R	26 F	Chr. tonsillitis	0	0	—	+ Slight	0 5 mg.	
4799 MC	31 M	Tuberculosis?	Old Pleurisy	0	Old rt. Pleurisy	0?	Slt. local 1 mg.	
7619 N	38 F	Chr. sinusitis Alv. abscess	0	0	0	+	+ 2 mg.	Sensitive to Strept. filtrates

allergy of the involved ocular tissues is an important factor in the clinical course of iritis.

In medicine many somewhat similar instances of sensitization come to mind, such as the sensitiveness of mucous membranes to pollens in hayfever, the manifestations of serum sickness, or recurrent attacks of urticaria. Specific sensitiveness to filtrates of the streptococcus of scarlet fever is utilized in the Dick test for immunity to scarlet fever. The shifting joint pains, swelling and redness seen in acute rheumatic fever are believed by some to be related more closely to anaphylactic reactions than to actual bacterial lodgment.

We have observed in cases of chronic and recurrent iritis in which after the exclusion, as completely as clinical and laboratory tests allowed, of such possible causes as tuberculosis and syphilis, and after the removal of all recognizable other possible causes, such as tonsillar and dental infection, recurrences of the iritis continued, following minor attacks of pharyngitis, or acute minor colds. Certain of these patients, at present under observation, are extremely sensitive to some streptococcal filtrates and not to others. Just how specific this sensitivity will prove to be is undetermined, but such observations may be helpful in the study of certain cases of chronic and recurrent iritis.

Etiology of chronic iritis

The following observations on cases of iritis studied subsequently to, and not included in our series of 200 cases, are arranged to show, if possible, any differences in etiology in chronic and acute iritis. The difficulties in formulating a clear definition of chronic iritis have already been referred to. For purposes of this discussion iritis has been called chronic if it persisted continuously for an arbitrary period of three months or more. Other cases clearly acute, or recurrent, have been so classified, and are presented for comparison with the chronic cases.

Table 4

IRITIS WITH REFERENCE TO POSSIBLE TUBERCULOSIS

	Evidence of Tuberculosis	Probable Tuberculosis	Total Cases
Acute	3	0	7
Recurrent	5	1	10
Chronic	7	3	9
	15	4	26

The classification was made by Dr. Brown on ophthalmologic data, before any tabulation of other medical facts was attempted, and only those cases included which had been thoroughly studied by both of us and which satisfied all conditions from his records, including accurate records as to the presence or absence of keratitis punctata.

These cases are part of a larger series which we hope shortly to report. Their selection from the larger group has been determined only on duration and completeness of observation and on opportunity for follow-up study.

In the tables the infections found are shown, and in the remainder of the tabulation the evidence for the presence or absence of tuberculosis is given. The incidence of tuberculosis as a possible factor is summarized in table 4. In acute iritis some evidence of the presence, past or present, of tuberculosis was found in 3 of 7 cases, in recurrent iritis in 4 of 10 cases, and in chronic iritis in 7 of 9 cases. In some instances only a slightly positive v. Pirquet test was obtained, and in others even when evidence was stronger, the remaining clinical evidence pointed clearly to etiologic causes other than tuberculosis. In 4, and possibly 5, of the 26 cases tuberculosis seemed to be the probable cause of the iritis. The increasing evidence of the presence of tuberculosis as we pass from acute to chronic iritis seems to have clinical significance, although the number of cases is too small to afford more than a suggestion of possible trend of incidence. Syphilis appears in only three cases. It will be observed that the inclusion of only those cases which were under observation for a minimum of three months tends to exclude more acute than chronic cases.

In some cases of recurrent and chronic iritis, a pronounced allergic response to bacterial filtrates was noted, and recurrence after acute pharyngitis and nasal colds was observed. In two of these the chronic clinical course had emphasized the possibility of a tuberculous etiology, but no evidence of tuberculosis could be found.

Summary

1. In comparing the results of studies of the etiology of iritis, proper interpretation requires a consideration of the relative prevalence of diseases in the populations from which the cases come.

2. Clinical observations and laboratory studies suggest that the mechanism of production of chronic and recurrent iritis includes allergic as well as embolic factors.

3. In a small series of carefully classified cases, there is an increasing incidence of evidence of tuberculosis and of probable tuberculous etiology in passing from acute, to recurrent, to chronic iritis. It is also evident, however, that the presence of evidence of past or present tuberculous infection does not alone warrant the conclusion of a tuberculous etiology.

122 South Michigan Avenue

Discussion: DR. WILDER: I would like to ask how much reliance is now placed

upon the intradermal tests with tuberculin and also upon the subcutaneous tests? It was my thought that the subcutaneous tests, in vogue years ago, as proposed by Koch himself, were recently somewhat discredited. In many places, I realize, clinicians are contenting themselves with the Von Pirquet test, or intradermal test, positive results from which can be obtained more frequently, in my own observation, than with subcutaneous tests. I should like to ask how much reliance we can place, and how we can evaluate these various tests as indicating an active focus of tuberculosis, somewhere in the body.

DR. IRONS: I suppose it is well recognized that the Von Pirquet test in the adult has a limited significance in the diagnosis of a disease such as pulmonary, or other, tuberculosis, speaking now apart from tuberculosis of the eye. Results with the subcutaneous test would seem to indicate that in many patients with tuberculosis a positive result is obtained. So far as I know, positive tuberculin tests are not obtained in persons who have not had tuberculosis in some form. The tuberculin test remains a practical measure in the detection of tuberculosis in cattle and is made the basis of extensive economic measures. As to how far tests of this sort afford adequate evidence of tuberculosis in iritis, we are merely using all of the measures that are available in order that we may present a background of evidence so that other results can be compared with those that we have found.

DR. BERENS: Was chronic infection in the intestinal tract suspected as an etiologic factor in these cases? If not, by what method was gastro-intestinal infection excluded as a possible cause?

DR. IRONS: Each of these patients was given a thorough physical examination such as one would give in the internal medical examination of any patient coming for consultation. In none of the cases was evidence suggested, by clinical examination or history, of gastro-intestinal disturbance of etiologic importance.

DR. A. L. BROWN: Has dietary change or study influenced any of these cases?

DR. IRONS: The maintenance of a sensible, well-balanced diet, would contribute to the general improvement in nutrition of any person. To that extent, it would contribute to the healing of such infections as these patients had.

DR. BROWN: If allergy is a factor why is uveitis so often unilateral?

DR. IRONS: In suggesting allergy in cases of recurrent and chronic uveitis I had in mind the original sensitization of the eye occurring by actual bacterial embolism. If recurrences occur we may be dealing with an eye which may have been previously sensitized by the first attack. Such a theory would include both embolic lodgment and allergy as a later factor in the course of the disease.

DR. JACKSON: In view of the relatively long and minute investigations of this subject of etiology of uveitis that Dr. Irons has been engaged in, there might arise a general impression to which he could not give definite facts in the paper, and I would like to ask this question: Is not his impression from his work as a whole in the direction of making the diagnosis of the etiology of uveitis perhaps entirely, or at least largely, a balancing of all probabilities of the case rather than the acceptance of definite proof in any particular one direction? Aren't the diagnoses that are based on what we now know of uveitis rather a balancing of different possibilities? Is the summary of the findings in the individual cases based on the entire element concerned?

DR. IRONS: There are some cases in which there is but one clearly marked infectious process. In such cases I assume there would be very little difficulty. There are other cases in which there is a historical relation between one cause among all infectious processes found, which leads one to the conclusion that probably that infection is related etiologically to the disease. There is another group in which several infections may be and are found, in which an opinion as to which was the central cause is certainly, at the outset,

a mere estimate of probabilities. In studying each individual case, conclusions, such as they were, were based on what was found and not primarily on probabilities. Throughout all of this study we have felt under no obligation to prove or disprove anything. We have merely been trying to set down such facts as we have found, sometimes at the expense of presenting what might appear to be rather undigested material.

DR. BROWN: Does the well being of the individual, including diet, living habits and mental and physical fatigue act as a sensitizing agent in precipitating an attack of iritis of uveitis when toxic factors are present?

DR. IRONS: Certainly the well being of the patient is expressed in nutrition and by that indefinite something which we call resistance which is undoubtedly related in part to nutrition. That will determine whether or not a disease process in any part of the body will heal or will continue to progress.

THE PATHOLOGY AND MANAGEMENT OF INTRAOCULAR FOREIGN BODIES

OSCAR B. NUGENT, M.D.
CHICAGO

The importance of carefully examining every injured eye for possible entrance and retention of a foreign body is emphasized. Possible routes of entry and types of pathological conditions that may arise from such bodies are described. Methods of diagnosis, preferred devices for localization, and therapeutic measures are discussed. From the Ophthalmic Department of the Chicago Eye, Ear, Nose, and Throat Hospital. Read before the Chicago Ophthalmological Society, May 18, 1931.

The presence of a foreign body in the eyeball always creates a grave situation, which often taxes the ingenuity of the most experienced operators. The position of the foreign body in the globe, the point of entrance, the parts of the eye affected, the composition, size, and shape of the foreign body, the length of time it remains in the eye, and the possibilities of intraocular infection, determine the gravity of the situation.

Every case of corneal abrasion should be most carefully examined. Too often the eye is superficially examined, and when no foreign body is located in the cornea, no examination of the inside of the eye is made to eliminate the possibility of the foreign body having passed into it.

Most oculists can recall cases in which the patient complained of the feeling of something in the eye, the foreign body having been removed, supposedly, by a fellow-workman, a first-aid attendant, nurse or doctor, or even an eye specialist, where it was discovered later that the foreign body had entered the eye.

The entrance of the foreign body into the globe, especially if small, often produces very little, or no pain. I have had two cases only recently where a missile was discovered in the globe by routine examination, and neither patient could remember having been struck in the eye at any time. Often the patient is aware of being struck in the eye only by the feeling of the impact.

In the absence of pain and especially if the vision is not impaired, the individual is likely to regard the incident lightly, not realizing the gravity of the situation, and, therefore, may not come under the observation of the oculist until much damage has been done.

The number of injuries from intraocular foreign bodies, as compared with the total number of eye injuries is quite difficult to tabulate, as the statistics available vary. Benneto[1] gives the number of perforating injuries at a little more than 5 percent, but he does not say how many of these are due to retained foreign bodies.

Spratt[2] found 101 intraocular foreign bodies in 15,000 patients. Slavik[3] reports the visual results of 542 per-

forating ocular injuries as varying from 6/6 to complete blindness in 71.7 percent; 35.5 percent of enucleations; and five cases of sympathetic opthalmia.

The passing of foreign bodies through the cornea is much more frequent than through the sclera.

PATHOLOGY

Anterior chamber. Some foreign bodies are much better tolerated in the anterior chamber than others. Stone and wood are liable to cause infection, while copper produces much irritation and inflammation, with much pus formation after, apparently, without bacterial invasion. This process has been described as a chemico-physiological reaction and the eye may go on to phthisis bulbi without perforation as is the usual outcome in panophthalmitis due to infection. Perforations of the anterior chamber have resulted in implantation cysts, traumatic granulomata of the iris, sarcoma and tubercle formation, and the growth of epithelium in the anterior chamber.

Ciliary body. Foreign bodies may enter the ciliary body from any of the anterior angles, and are more liable to cause sympathetic ophthalmia here than in any other location in the eye.

Lens. The lens shows the greatest tolerance for foreign bodies. If the capsule is cut and aqueous comes in contact with the lens substance, a traumatic cataract will result; but cases are on record[4] in which foreign bodies have entered the lens and no cataract resulted. This is doubtless due to the fact that no aqueous entered the lens, perhaps on account of the perfect cementing of the tear in the capsule. Copper in the lens does not produce the chemico-physiological reaction referred to above.

Perforation of lens capsule through which aqueous enters may result in a complete opacification of the lens, causing much swelling, and secondary glaucoma may follow.

Vitreous. Parsons[5] describes four routes by which foreign bodies enter the vitreous: first, cornea, pupil and lens; second, cornea, iris and lens; third, cornea, iris and zonula; fourth, conjunctiva, sclera, and ciliary body.

The subsequent treatment and after effects depend much on the route of entrance. The foreign body may pass through the vitreous and through the sclera on the opposite side, or as Collins[6] states, may rebound and fall low in the vitreous body.

If the foreign body passes through the iris, hyphema may result; and if the choroid and retina are injured, hemorrhage into the vitreous; while iron and steel bodies may be aseptic themselves, yet sepsis can gain entrance from the conjunctical sac, and infection with panophthalmitis may ensue. Here, as in the anterior chamber, copper may produce chemico-physiological reaction and phthisis bulbi may result, often leaving a clear cornea, and apparently, a normal anterior chamber.

Fig. 1 (Nugent). Prof. Comberg (Berlin). Contact glass with four leaded dots for marking, 20 mm. in diameter with dots 10 mm. apart.

Retina. A projected missile may pass through the sclera and choroid, and stop in the retina; or it may pass on through the vitreous and become lodged in the retina on the opposite side. If the media is clear, it may be seen with the ophthalmoscope. In a short time it may become encapsulated with connective tissue, or infection may set in. In the former case, useful vision may result for many years. Later, however, there may result a slow form of retinal degeneration and blindness eventually ensue. Other complications are retinal detachment; siderosis, and sympathetic ophthalmia.

Choroid. The choroid reacts to for-

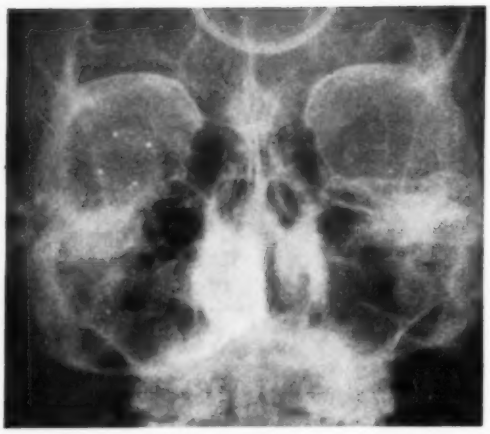

Fig. 2 (Nugent). Case E. A. Steel in right eye localized with Comberg's contact glass. Anterior-posterior view.

eign bodies similarly to the retina and vitreous. Iron and steel remaining in the eye for some time produce siderosis, which is found most commonly in the tissue surrounding the foreign body, the unpigmented epithelial cells of the ciliary body, the retina, the epithelial cells lining the anterior capsule of the lens, the iris, the cornea, and the ligamentum pectinatum. Removal of the foreign body results in a gradual disappearance of the siderosis.

Diagnosis of intraocular foreign bodies is usually quite simple, but occasionally becomes a very difficult task. Grocco[7] reports a case of a man 34 years old with a metallic foreign body in the fundus for 22 years. It could be seen with the ophthalmoscope and had been diagnosed as retinal separation, choroidal tumor, glioma, and hydatid cyst.

Pseudo-foreign bodies have been described by Coplez[8]. Begle[9] states that the damage done to the eye in foreign body injuries is directly proportional to the size of the foreign body.

There are many methods of diagnosis of intraocular foreign bodies, some of which are: slit-lamp microscopy[10]; x-ray; magnet detection; chemical examination of the aqueous; and ophthalmoscopy.

Slit-lamp microscopy is the quickest and most accurate method of detecting the presence of intra-ocular foreign bodies in those cases where the missile entered through the cornea. It is accomplished by tracing the path through the cornea, iris, or lens, and by observing early inflammation.[11]

In cases of light-weight objects which do not penetrate deeply into the eye, as wood[12], stone, glass, and even cilia[11-13], the slit-lamp is best for detecting their presence.

The x-ray has perhaps the widest use of all, and there are various methods of use. Glass plates are the best with which to record x-ray findings[14]. Certain substances produce denser shadows than others, the degrees of their intensity are given as follows: lead, steel, iron, copper, brass, stone, plumbago, and glass. Failure to record most foreign bodies is due to faulty x-ray technic.

Dixon[14] states that failure to demonstrate the presence of a piece of iron or steel 0.1 mm. in size is inexcusable.

Our method of demonstrating a metallic foreign body, is to make an exposure on a 4 x 5 inch glass x-ray plate, and if, by careful examination, a foreign body is found, the next step is to localize it. This we do by one of

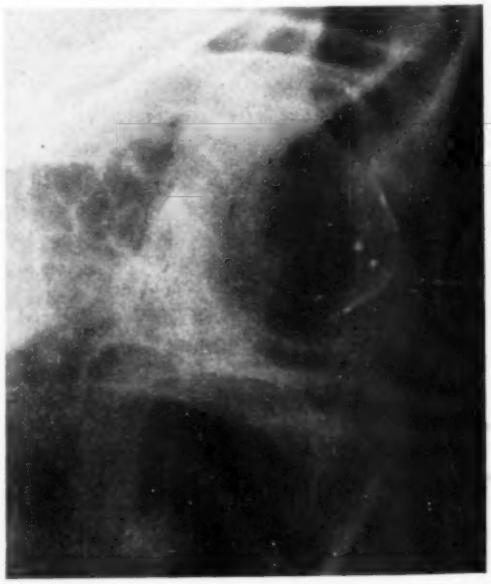

Fig. 3 (Nugent). Case, E. A. Lateral view. Comberg's contact glass.

the various methods. The Sweet improved method of localization is our preference. Another method we also use for localizing is the Comberg method (figures 1, 2, 3, 4) with contact glass; still another method which we have used is to place a metallic applicator directly against the center of the cornea both for lateral and anteroposterior views. Some foreign bodies, such as wood, glass, and stone, are of light material and do not cast a shadow with a ray strong enough to penetrate the skull. These objects[15], because of their light weight, do not, as a rule, penetrate deeply into the eye, and, therefore, can be demonstrated by means of the Voight, or extracranial method. The use of Patton markers is another method, while still another is the Altschul[16], in which five exposures are made, one with the eye fixed directly forward and the other four with the axis of fixation directed in the other four directions at a 30 degree deviation from the center; then, by elaborate calculations, using the sagittal axis as a basis, the location is made.

A new method recently described by Arganoras of Buenos Aires[17], merits comment. It consists of a round ring 25 mm. in diameter which is held over the eye for anteroposterior aim, and a differently shaped ring representing the cornea, which is also used for lateral view.

Coppez's method has been modified by Mannoli[18]. This consists of withdrawing aqueous and treating it with nitric acid in case of iron, and hydrosulphuric acid in case of suspected copper.

TREATMENT

A foreign body discovered in the eye should be localized, if possible, and then removed. This is best accomplished, in cases of magnetic bodies, with the magnet.

The first mention of the use of the magnet for the purpose of extracting foreign bodies from the eye is in a book written by Hieronymous Braunschwig, entitled "Dis Ist Das Buch Der Cirurgia, Hautwirkung Der Wundertznie". It was written in 1462 and published in 1497. Fabricius Hildamos performed the operation in 1624. Milkes suggests its use in 1745, and Morgagni again in 1779. These applications, however, were only for the removal of superficial foreign bodies.[19]

Nikolaus Meyer (1842) has been given credit for being the first to remove a foreign body from the interior of the eye with a magnet[20]. The magnet was also used by Dixon in 1859. McKeuwn of Belfast, successfully removed a piece of steel from the vitreous in 1874[21].

The first magnet constructed expressly for the purpose of removing

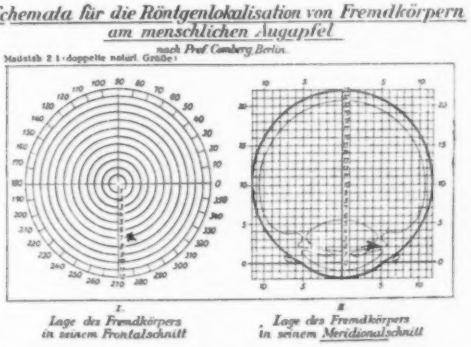

Fig. 4 (Nugent). Case, E. A. Localized on Comberg's chart.

foreign bodies from the eye was by Hirschberg[22], in 1877. Many other magnets of similar type were constructed and used. The best known were the ones made by Sweet[23] (1902), Johnson[24] (1899), Bradford[25] (1881), Hubbell[26] (1887), Shell[27] (1883), and Sherman[28] (1895) who developed a magnet with a pulling power of 125 pounds to the square inch.

Volkman of Berlin (1888) constructed a rather peculiar magnet with a soft iron core, 14 cm. in diameter at one end, 5 cm. at the other end, and 95 cm. long[29].

Mellenger (1887) also constructed a magnet based on the solenoid principles[30]. The most powerful and best magnet up to that time, however, was the giant magnet of Haab[31]. This instrument was first demonstrated by Haab in 1892 before the Heidelberg Ophthalmological Society and was in-

tended to overcome the difficulty of bringing the magnet part into direct contact with the foreign body. Many of Haab's ideas proved valuable additions to the technique of magnet extraction.

The Victor large electromagnet has supplanted the Haab instrument, as it has a lifting power of about 400 pounds per square inch. Allport (1917) was of the opinion that the large Victor magnet and the hand magnet designed by Sweet, would constitute a complete equipment[32]. It might be mentioned here that King (1922) successfully used a two-ton industrial magnet in two cases of intra-ocular foreign bodies[33]. Haab gave a clear description in English of the removal of intra-ocular foreign bodies in 1902[34].

In the experience of many operators, the best route by which to remove a foreign body from the eye is from some point anterior to the ciliary body. Fisher[35] in 1903 stated that an x-ray for localization of a foreign body in cases where a traumatic cataract is present is not necessary, but that the cataract should be removed and the foreign body extracted through the pupil. This has been my preference.

In cases where the foreign body is behind the iris and lens, and no cataract is present, it should be drawn around the lens into the anterior chamber, and removed by incision in the cornea, according to the methods of Haab. If the foreign body becomes entangled in the iris it can be removed through an iridotomy. In no case where it is possible to remove a foreign body through the anterior route should a diascleral method of extraction be done[36], even though it is necessary to remove a clear lens.

If, however, it is impossible to bring the foreign body forward, it is better to remove it through the sclera than to permit it to remain in the eye.

Often the foreign body is pulled off the tip of the magnet by the edges of the scleral wound. This can be easily overcome by using a blunt forceps held against the tip of the magnet. Then, by inserting the forceps into the wound (the current should first be turned on) as soon as contact with the foreign body has been made, the blades should be slightly separated, and the forceps withdrawn. This will permit the object to be removed readily.

Nonmagnetic bodies should be removed by means of forceps. Cross removed a lead shot[37] from the vitreous body, having the forceps guided to the shot by an expert fluoroscopic operator, using a double plane fluoroscope.

After the diascleral method has been used, it has been my practice to use the cautery after the manner of Gonin for detached retina, for the purpose of sterilization of the wound, and to prevent future detachment of the retina. This has also been described by Strubel[38].

Aftertreatment should be about the same as that following any other intra-ocular operation. Furthermore, special measures should be employed to combat after-infections, such as the use of foreign protein, blood injections as described by Fisher[39], or specific antitoxins.

In case the lens has been injured and a traumatic cataract is present, the cataract should be removed first, and then extraction by the anterior route be made through the same incision.

231 West Washington st.

References

[1] Benneto, F. R. Penetrating and perforating ophthalmic injuries. Canad. M. A. Jour., 1930, November, v. 23, p. 668.
[2] Spratt, C. N. Intraocular foreign bodies. Amer. Jour. Ophth., 1930, December, v. 13, p. 1079.
[3] Slavik, B. Perforating ocular injuries. Bratisl. lekár. listy., 1929, v. 9, p. 1133.
[4] Blatt, N. Tolerance of the crystalline lens to metallic foreign bodies. Amer. Jour. Ophth., 1930, February, v. 13, p. 132.
[5] Parsons, J. H. Pathology of the Eye. (G. P. Putnam's Sons, London), 1908, v. 4, p. 1172.
[6] Collins and Mayou. Pathology and bacteriology of the eye. P. Blakiston's Sons, 1925, 2nd ed., p. 389.

[7] Crocco, A. Intraocular metallic foreign body with conservation of vision. Arch. de Oft. de Buenos Aires, 1929, v. 4, p. 555.
[8] Coppez, H. Pseudo-foreign bodies of the eye. Arch. d'Opht., 1929, August, v. 46, p. 449.
[9] Begle, H. L. Perforating injuries to the eye by small steel fragments. Amer. Jour. Ophth., 1929, December, v. 12, p. 940.
[10] Castroviejo, R. The slit-lamp in diagnosis of intraocular foreign bodies. Texas State Jour., 1930, October, v. 26, p. 428.
[11] Castroviejo, R. Contribution to the importance of biomicroscopy in ophthalmic diagnosis. Arch. Physical-Therapy, X-ray and Rad., 1930, November.
[12] Vejdovsky, A. Some rare ocular injuries. Bratisl. lekár. listy., 1930, v. 10, p. 29.
[13] Panico, E. Penetration of cilia in the anterior chamber and in the posterior chamber. Anales de Oft., 1930, May-June, v. 58, p. 417.
[14] Dixon, Geo. S. Report on examinations for foreign bodies. Clinical report on the N.Y. Eye and Ear Infirmary, 1930, March, v. 1, p. 3.
[15] Mills, L. and Jeanson, E. C. Unrecognized magnetic intraocular foreign bodies and their legal aspects. Arch. of Ophth., 1930, August, v. 4, p. 194.
[16] Altschul, W. Roentgenologic localization of an intraocular foreign body. Klin. M. f. Augenh., 1930, June, v. 64, p. 838.
[17] Argañaraz. Arch. de Oft. de Buenos Aires, 1931, January and February, v. 6, Nos. 1 and 2, p. 69.
[18] Mannoli, I. Chemical diagnosis of intraocular metallic foreign bodies. Saggi. di Oftal., 1929, v. 4, p. 371.
[19] American Encyclopedia of Ophthalmology, 1915. v. 6, 7, 8.
[20] Meyer, Nikolaus. Medizinische Zeitung (Verein für Heilkunde in Preussen), v. 1, p. 1942, v. 2, p. 50.
[21] McKeown, W. A. Extraction of a piece of steel from the vitreous humor by the magnet. Brit. Med. Jour., 1874, v. 1, p. 850.
[22] Hirschberg, Ueber Entfernung von Eisensplittern aus den Augen. Inneren. Verhandl. d. Gesselach. f. Chis., 1888, v. 10, pt. 2, p. 41.
[23] Sweet, W. N. Jour. Amer. Med. Assoc., 1902, v. 32, p. 468.
[24] Johnson, W. B. Description of a portable electromagnet. Arch. of Ophth., N.Y. 1899, v. 28, p. 328.
[25] Bradford, H. W. The electromagnet in ophthalmology with description of a new magnet. Boston Med. and Surg. Jour., 1881, v. 104, p. 292.
[26] Hubbell, A. A. Buffalo Med. Jour., 1887-8, v. 27, p. 545.
[27] Snell, S. The electromagnet and its employment in ophthalmology. Monograph, London, 1883.
[28] Sherman, H. A. The electromagnet for the removal of foreign bodies from the eye. Med. Record. N.Y., 1895, v. 48, p. 212.
[29] Volkman, W. Theorie der Augen magnete. Klin. M. f. Augenh., 1888, v. 40, p. 1.
[30] Mellinger, C. Über die Magnet Extraktion an der Basler ophthalmologische Klinik, Monograph Basle, 1887.
[31] Haab, O. Eine neuer Elektromagnet zur Entfernung von Eisensplittern aus dem Auge. Beitr. z. Augenh., 1894, v. 13, pp. 68-96.
[32] Allport, F. Removal of steel particles from the interior of the eye by the magnet. Ill. Med. Jour., 1917, v. 32, p. 395.
[33] King. Eye, Ear, Nose and Throat Monthly, 1922, v. 1, p. 359.
[34] Haab, O. Removal of foreign bodies from the eye. Jour. Amer. Med. Assoc., 1902, v. 39, p. 463.
[35] Fisher, W. A. One hundred and fifty magnet operations. Ophthalmic Record, 1903, January.
[36] Comberg, W. The technique of dia-scleral magnet operation. Klin. M. f. Augenh., 1930, June, v. 84, p. 817.
[37] Cross, Geo. H. Removal of lead shot from the vitreous. Amer. Jour. Ophth., 1929, December, v. 93, p. 1034.
[38] Strubel, L. When should conjunctival flap be used in perforating injuries of the eyeball? Schweiz. med. Woch., 1930, October, v. 60, p. 947.
[39] Fisher, W. A. Sympathetic inflammation. Read before Chicago Ophthalmological Society, 1927.

INTRACAPSULAR CATARACT OPERATION

Simplified Smith Indian

W. A. FISHER, M.D., F.A.C.S.
CHICAGO

The advantages of intracapsular extraction are discussed. The fact is pointed out that any of the various methods gives best results in the hands of those most habituated to it. A detailed description is given of the simplified Smith method. Practice on the eyes of 100 six-weeks-old kittens is advocated as preparation before attempting the intracapsular method. Read before the Fort Worth Eye, Ear, Nose and Throat Society, March, 1931.

There are many good reasons why the majority of ophthalmic surgeons favor the capsulotomy method of operating for senile cataract.

First: Text books in all languages describe the different steps of a cataract operation by the capsulotomy method and discourage any form of intracapsular.

Second: It is not a simple matter for one who has mastered the delicate technique required to operate on a cataract by the capsulotomy method to change to a new method the technique of which is admittedly more delicate than that which he has been accustomed to use.

Third: Many competent surgeons have tried the intracapsular operation, found it difficult, and after operating a few times, have published results which they considered unsatisfactory.

Fourth: Surgeons operating in large clinics praise the method used by them, and naturally stress the complications of all other methods.

Fifth: In Europe, it was difficult to find intracapsular operators until within the last two years, the exception being Kalt in Paris, Elschnig and Kubik in Prag, Barraquer and Vila Cora in Barcelona, and Poyales in Madrid.

Sixth: The lack of opportunity to operate often and the knowledge that the intracapsular is more difficult than the capsulotomy method are good reasons for not doing the intracapsular operation.

But granting the above reasons, there are many competent operators who admit that the intracapsular operation offers better results and less complications than the capsulotomy for those who have been fortunate enough to go to India, where this method is practiced very extensively, and operate many times.

However, I am going to show, before I finish, how one may become an expert cataract operator by any method, without going to India. The method I shall describe can be mastered by any surgeon in his own office.

Many surgeons, including the author, believe that Smith's ideas will be lasting, and the more one operates by his method, the greater credit seems due him. Col. Smith's technique seemed perfect when I made my first trip to India in 1913, but eighteen years have suggested many changes and he has made many modifications.[1]

Smith method. In the United States, many operators give preference to the Smith technique, namely, Lewis Beck, Borden, Burleson, Gill, Goodman, Hallett, Judkins, King, McReynolds, Meding, Millette, Mills, Pratt, Dorland Smith, John Smith, Sorrell, Thompson, Thorne, Timberman, Vail, and others. One of my associates, Dr. O. B. Nugent,[2] prefers the modified Barraquer; another, Dr. Ramon Castroviejo, the capsule forceps. The author personally prefers not to decide which operation to select for senile cataract until after the incision has been made. If blood obstructs the field and cannot be removed, or if the pupil contracts, the Smith Indian method is always selected.

Two years ago, or prior to 1929, few, if any, operators were removing lenses within their capsules in Germany or Austria, by any method, but today, many in Germany are following the Elschnig intracapsular method, and the Elschnig method is the rule in Vienna. Safar[3] of the Meller clinic in Vienna, reported good results in his first fifty cases

operated by the Elschnig method, after he had observed Elschnig operate for two weeks. In 1929, Safar[4] of the Meller clinic in Vienna and Castroviejo[5] of Chicago, wrote long articles in German and Spanish giving the good points of the capsule forceps, by the Elschnig method, and some of the disadvantages of the Smith and Barraquer methods, Safar stating that "the delicate technique necessary in the intracapsular operation cannot be gained by operating on the cadaver, nor upon pig's eyes," and he is right.

It is quite possible that they would not stress these faults if they were as well informed regarding the methods criticized as they are with the Elschnig technique.

Forceps method. In the United States, Knapp, Peter, Lancaster, Greenwood, Verhoeff, Parker, Crisp, Black, Finnoff, Ellett, Castroviejo, Gradle, Suker, and many others; and in Europe, Meller, Safar, Blaskowics, Messman, Arruga,[6] Elschnig,[7] Kubik,[8 9] Poyales,[10] Basterra,[11] Castroviejo, Novajas, and others who use capsule forceps, employ many points in the Smith technique, and do so for safety.

Barraquer method. The Greens, Hartshorn, Harrison, Wolfe, Nugent, Fisher, Woodruff, McLean, and others in the United States operate by the Barraquer method with modifications. The modifications may not appeal to Barraquer, but seem helpful to those who have made them.

Anyone observing Elschnig in Prag, Knapp in New York, Poyales in Madrid, or Castroviejo in Chicago, operate with the capsule forceps; Barraquer or Vila Cora in Barcelona; Green in San Francisco, Wolfe in Marshalltown, Iowa, or Nugent in Chicago by facoerisis; Smith in Amritsar, India, or Holland or Cruickshank in Shikarpur, India, by the Smith method; or Meller and others in Vienna, Wesseley in Munich, Krookman in Berlin, Magitot in Paris, by the capsulotomy method, would naturally conclude that the method which they used was ideal in their hands.

It cannot be expected that all operators can operate as skillfully as these experts, but that is no reason to condemn their methods. The technique of any intracapsular method is considered to be more difficult than the capsulotomy method, but that does not make the capsulotomy operation the best or safest operation.

Healthy criticism should always be welcome. Black,[12] finding the Guist speculum good, made an addition to it to make it better.

It would be a step forward in ophthalmic surgery if new methods and procedures were not condemned in medical literature by operators just because the technique appears difficult, or because they do not personally approve them. In medicine, as in other lines, it is only human to disparage new methods when compared with one's own.

Modifications of the Smith Indian method. Assuming the tension to be normal and the eye clean and operable:

First. If the blood-pressure is over 180 mm. Hg., eight ounces of blood is withdrawn from a vein, one hour before operating as is done in Elschnig's clinic.

Second. The eyelids and skin around the eye are painted with two percent tincture of iodine.

Third. Two percent novocain is injected to relax the orbicularis palpebrarum (Fig. 1).

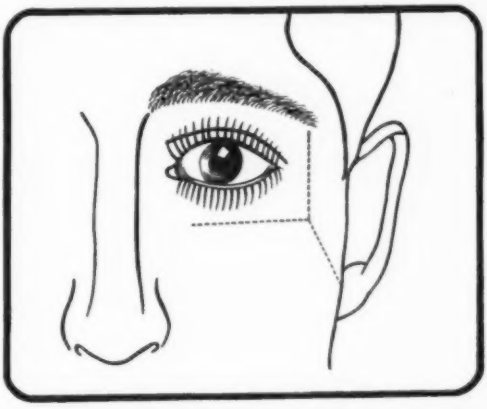

Fig. 1 (Fisher). Ten drops of two percent solution of novocain are injected under the skin at the junction of the dotted lines with a very small, sharp dental needle. After three minutes, five cc. of a two percent novocain solution are injected along the dotted lines, deep down to the periosteum as the long needle is being slowly withdrawn.

Fourth. A suture is placed in the superior rectus muscle to aid, when necessary, in making the toilet (Fig. 2).

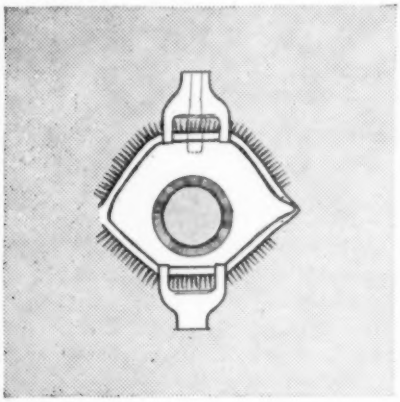

Fig. 2 (Fisher). A suture is placed in the superior rectus muscle, to be used later for holding the eye when necessary while making the toilet.

Fifth. A conjunctival flap is made, with lid hooks holding the eye open, instead of using a speculum (Fig. 3).

Sixth. The flap is turned down over the cornea to keep it from being cut when the iridectomy is done.

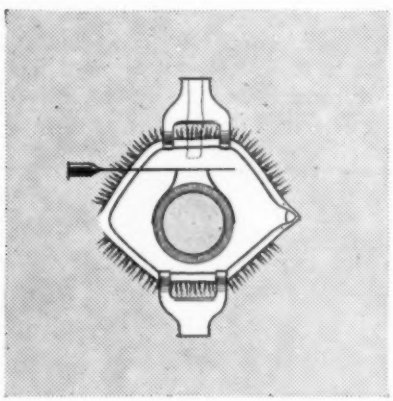

Fig. 3 (Fisher). Making the conjunctival flap. The knife must not cut deep into the sclera on account of bleeding. The superior rectus suture is in position.

Seventh. A conjunctival suture of fine black silk is inserted on either side of the coloboma and the untied sutures are made slack to allow escape of the lens (Fig. 4).

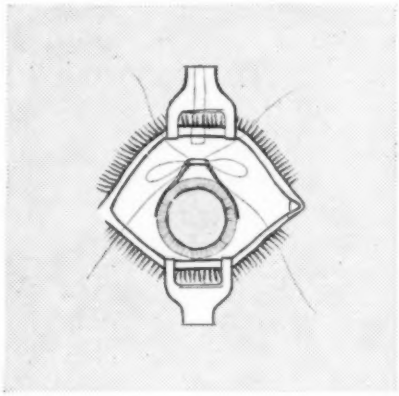

Fig. 4 (Fisher). Two fine black silk sutures are placed in the conjunctiva, one on either side of the coloboma, and left slack for exit of the lens. Suture is in superior rectus muscle.

Eighth. A spatula is used to straighten out the coloboma.

Ninth. If the lens cannot be delivered without dangerous pressure, the needle is used (Fig. 5) or the operation can be abandoned and the one most familiar to the operator substituted.[13]

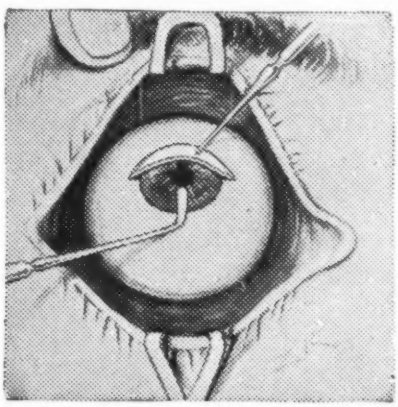

Fig. 5 (Fisher). Needle delivery. When the lens refuses to be born, which is usually because the incision is too small, this should be enlarged with bluntpointed scissors. If the lens still cannot be delivered without excessive pressure, Fisher's needle can be stuck into the lens, while pressure is being made with the Smith hook, or the operation can be finished by the capsulotomy method. It is not often necessary to use the needle after the technique is well understood.

Tenth. The two conjunctival sutures are tied and toilet made (Fig. 6).

Eleventh. Should the capsule rupture, the cortex and often the capsule, can be removed from between the stitches

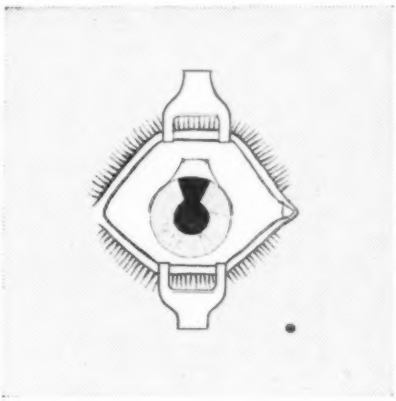

Fig. 6 (Fisher). The lens has been delivered. The two conjunctival sutures are tied and the superior rectus suture has been removed. Forceps should be used to tie the sutures. This technique can be acquired by using a suture in a napkin and tying with forceps many times.

with forceps, spatula, or with Elschnig's spoons.

No instruments should be passed into the eyeball without resterilization. This renders it advisable to have several spatulas or spoons.

Twelfth. Atropine having been instilled twice before the operation, the operation is completed by passing a skin suture in the upper and lower lids and tying loosely (Fig. 7).

The Smith operation[14,1] is performed by Smith practically like the capsulotomy operation, with one hand and requires less perfect ambidexterity than the forceps or Barraquer operation, and is, naturally, the easiest intracapsular operation.

The Barraquer technique as done by Barraquer,[15] removes the lens by tumbling with one hand. The Barraquer technique as modified by Fisher, Green, Nugent, and others, requires one hand to hold the erisifake, while the other hand is used to make pressure upon the cornea, with the Smith spoon or Nugent's expression forceps to aid delivery.

Forceps operation. In the forceps operation, so skillfully performed by Elschnig, one hand is engaged in grasping and holding the lens capsule, while the other hand is used to make pressure upon the cornea with the Smith hook or Nugent's expression forceps to aid delivery.

Experience. Many ophthalmic surgeons advise the mastering of the capsulotomy operation before attempting the intracapsular, but great help will be gained by operating upon one hundred six-weeks-old kittens, and it will be more effective if all are done in twelve months, or less.

The kitten's eye, for operative purposes,[13] is quite like the human eye. The cornea is about 10 to 11 mm. in diameter; the anterior chamber is quite like the human, and the iris is also similar to the human. Pigs' eyes, so often recommended are not like the human, and the delicate operative technique necessary cannot be obtained by operating upon them.

One hundred kittens (two hundred eyes) offer the following: two hundred operations on the external rectus muscle; two hundred on the internal rec-

Fig. 7 (Fisher). Skin suture in upper and lower lids is loosely tied ready for yellow oxide of mercury, eight grains to the ounce, to be applied freely before placing the bandage upon both eyes. At the end of 24 hours, the lid suture is removed, and the operated eye bandaged. Patient is allowed much freedom in getting up. The operated eye is inspected on the fourth day and smoked glasses given on the seventh day. Before discharging a patient from the hospital the conjunctival sutures are removed, if they do not work out themselves. The novocain injection makes lid suture necessary.

tus muscle; two hundred enucleations; two hundred iridectomies; two hundred cataract operations—total one thousand operations.

When the above are carefully done, with sharp instruments and under the same conditions as when operating on human eyes, the operator will be in a fair way to operate successfully by any method, and naturally, more intracapsular operations will be done. The Smith method, being the easiest, would reasonably come in for its share of followers.

Practice obtained in this manner is much more effective than time spent in observing competent operators doing only one method, and often condemning all others.

It would be interesting if some of the surgeons who have reported a very high percent of complications would become more familiar with the intracapsular technique by operating upon one hundred six weeks' old kittens. When they have done this, their complications might be reduced to the same number or even lower than those of the capsulotomy method.

If a surgeon can operate on senile cataracts by the intracapsular method with as few complications at the time of operating as he would have if operating by the capsulotomy method, it would be natural for him to operate by the intracapsular method because postoperative inflammation would be less and visual results more attractive.

After-treatment in intracapsular operations. The fewer the dressings the better, but operators desirous of information may inspect the eye more freely after using conjunctival sutures.

Uncomplicated cases do not require much, if any, after-treatment. If the sutures do not come away, they may be removed, and dark glasses given the seventh day, and the patient may leave the hospital in a few days after that.

The technique described is applicable to any method of operation for senile cataract.

Conclusions. If the eyes of one hundred six weeks' old kittens are operated upon, the novice will be better qualified to operate than he would be by observing operations for several years; and the experienced operator will be well repaid for so doing.

The intracapsular operation, by any method, when properly performed, gives better resulting vision than the capsulotomy method when it is properly performed. There is less eversion of the cornea, less iris prolapse, less postoperative inflammation, and a second operation is not required. The operation can be done at any time that poor vision in the better eye prevents the patient from doing that which he is called upon to do.

231 West Washington street.

References

[1] Smith, Henry. Treatment of cataract, and some other common ocular affections. Butterworth and Co., Calcutta, India, 1928.
[2] Nugent, O. B. The pathology of hernia following cataract operation. Ill. Med. Jour., 1930, January.
[3] Safar, Karl. The extraction of senile cataract in the capsule by the method of Stanculeanu-Török-Elschnig. Amer. Jour. Ophth., 1930, v. 13, March, p. 219.
[4] Safar, Karl. Zeit. f. Augenh., 1929, September, v. 69, p. 147.
[5] Castroviejo, Briones R. Una estadística de cien casos de operados de la cataracta. Medicina Ibera, 1929, May. Revista Cubana de Oftalmologia, 1929, September-October.
[6] Arruga. Porque la gran mayoría de oculistas no practican la operación de la cataracta por medio de la ventosa? Arch. de Oft. hisp.-amer., 1928, January.
[7] Elschnig. Der gegenwartige Standpunkt der Altersstar-extraktion. Gesell. der Aerzte Wiens, 1928, December.
[8] Kubik, Karl. Ueber Altersstar Extraktionen in der Kapsel; Deutsche Ophth. Gesell., Heidelberg, 1927.
[9] Kubik, Karl. Ueber die intrakapsulare Extraktion nach Stanculeanu-Török. Klin. M. f. Augenh., 1929, v. 82, p. 592.
[10] Poyales, F. La extracción total de la cataracta. Arch. de Oft. hisp.-amer., 1928, June.
[11] Basterra. Sobre la extracción total de la cataracta senil con pinza capsular. Arch. de Oft. hisp.-amer., 1922, September, p. 517.

[13] Black, Melville. The Guist speculum. Amer. Jour. Ophth., 1930, December, v. 13, p. 1066.
[14] Fisher, W. A. Senile cataract. Chicago Eye, Ear, Nose and Throat Col., 1925.
[15] Smith, H. Fisher's Senile Cataract. Chicago Eye, Ear, Nose and Throat Col., 1925.
[16] Barraquer, I. Fisher's Senile Cataract. Chicago Eye, Ear, Nose and Throat Col., 1925.

INTRAOCULAR SARCOMATA

Report of cases

L. L. McCoy, M.D.
SEATTLE, WASHINGTON

Seven cases of intraocular sarcoma of the left eye have been seen by the author. Five of these are reported in this paper. Two have been described previously in this Journal. All eyes save one were enucleated. All the patients are living after periods ranging from eight months to three years. Read before the King County Medical Society, Seattle, Washington, April 27, 1931.

In this series of seven cases, six of the tumors were of choroidal origin while one was in the iris. Four occurred in men and three in women. Six of the patients were above 43 years of age, the oldest being 71 years, while one patient was 23 years of age. Enucleation was done in six cases; one patient refused operation and has been under cultists' treatment since. The left eye was involved in all of the cases. All cases are under rather close observation, the longest period being three years, the most recent about eight months.

Case 1 was reported in the May, 1929, issue of the American Journal of Ophthalmology.

Case 2 was reported in the August, 1929, issue of this Journal.

Case 3. Mrs. L. B., aged 43 years, white, housekeeper at the Swedish Hospital was seen December 2, 1929. Her complaint was drowsiness, mild temporal headaches and asthenopia.

Past history was irrelevant except that four years ago she was struck a severe blow diagonally across her left eye. The eye was ecchymotic for several days. Three months ago she began to notice that she had trouble in seeing objects on her left side. Family history irrelevant.

Examination: Vision R.E. was 20/25, L.E. 20/50 without correction. With the correction she was wearing, it was R.E. 20/15—, L.E. 20/15—. The right eye was normal in all respects except for the refractive error. The left eye was normal externally except for moderately dilated blood vessels on the nasal side. Ophthalmoscopic examination revealed clear media, a large, moderately irregular, quite flat, gray, mottled, retinal detachment in the upper nasal quadrant, extending from the equator to the disc margin. Along the anterior edge of the detachment and sparsely scattered over its anterior surface was a considerable number of variously sized and shaped pigment clumps. Transillumination revealed a solid mass under the detachment. Tension was normal. Blood Wassermann and tests for tuberculosis were negative. Blood pressure was 122/86. Some pyorrhoea was present. Tonsils were large and septic. A general physical examination was otherwise negative. January 15, 1930, a hypodermic needle was inserted through the sclera beneath the detachment but no fluid could be withdrawn.

Tentative diagnosis was melanotic sarcoma of the choroid of the left eye.

Treatment: immediate enucleation was advised and was done on February 3, 1930, under general anesthesia. The specimen was sent to the Army Medical Museum at Washington, D.C., and the final report came back as follows: "Microscopic—flat, spindle cell, melanotic sarcoma extends from the nerve to the equator. It appears to have partially obliterated the sclera along

CASE 1.

CASE 2.

CASE 3.

CASE 5

CASE 6

Drawings taken from the mounted sections showing the location, size and shape of the tumors as indicated by the shaded portion.

fibers of the ciliary nerve. There is a broad shallow cyst of the retina over two-thirds of the tumor. The iris is atrophic and in contact with the posterior surface of the cornea and there is a posterior synechia just lateral to the pupil on one side."

There have been no evidences of a recurrence or metastases thus far.

Case 4. C. C., aged 71 years, white man evidently quite healthy and active for his age, was seen April 4, 1930. His chief complaint was failing vision in the left eye for the previous two or three months.

Personal history was otherwise irrelevant. His mother succumbed to cancer of breast.

Examination: Vision R.E. was 20/70; L.E. fingers counted at two feet. His right eye was normal organically for his age. The left eye was normal as far as the lids, lacrymal apparatus, muscles, and cornea were concerned. There was considerable conjunctival congestion with quite marked brownish discoloration of the sclera below and temporally which patient said had been there for years. The iris seemed normal and the anterior chambers of each eye were equal in depth. The left pupil was round, regular, equal to the right in size but sluggish in reaction. Tension of both eyes was equal and normal by palpation. Ophthalmoscopically, the aqueous and vitreous were clear. Projecting into the vitreous from the temporal side and apparently from about the equatorial region was a large, grayish brown, detachment of the retina, quite smooth but seemingly somewhat more pedunculated than a simple detachment of the retina. It projected into the vitreous nearly to the temporal edge of the disc. Transillumination was positive for a solid mass under the detachment.

Diagnosis and recommendation: Tumor of the choroid, probably melanotic sarcoma. Immediate enucleation was advised.

Operation was refused. He immediately went to his home and placed himself in the hands of a Christian Science practitioner.

Case 5. Mrs. A. M., aged 46 years,

white, housewife, was seen April 29, 1930. Chief complaint was ill-fitting glasses and severe general headaches. The patient said it seemed as though she were trying to see with her left lid half closed. Past and family histories were irrelevant.

Examination: Vision R.E. was 20/30, L.E. 20/200+; 20/15 and 20/200+ with glasses. Slight convergence insufficiency was noted. Externally, the eyes appeared the same and healthy in appearance except that the left pupil reacted more sluggishly than the right. Ophthalmoscopically, the right eye was normal. Under mydriasis, the left anterior segment was normal and the media were clear. Projecting into the vitreous chamber, apparently from the equatorial region on the nasal side, was a large retinal detachment which obstructed the view of the optic disc. It was quite smooth, dark colored and presented no visible tear. Transillumination revealed a solid mass under the detached retina. Tension was normal.

Diagnosis: Melanotic sarcoma of the choroid. Treatment: Immediate enucleation was advised. On May 5, simple enucleation with Guist bone sphere transplant was performed under general anaesthesia. The eye was sent to the Army Medical Museum, Washington, D.C., for diagnosis. Final report was as follows: "There is a melanotic spindle-cell sarcoma arising beside the disc and extending forward beyond the equator into the globe approximately 14 mm. There are a few areas where round cells are present but no definite penetration of the sclera is found. The retina is detached over the tumor. The iris is edematous. The tumor appears rather rapidly growing."

Case 6. Mrs. O. B., a rather active white housewife, 64 years of age. Up to May 14, 1930, the patient had no discoverable ocular disturbance except quite marked myopia. Vision: R.E. was 20/25—1 with correction, L.E. 20/25—1 with correction. On May 14, 1930, she came in complaining of sudden loss of vision in her left eye within the previous twenty-four hours. She apparently had a fairly large exudate or hemorrhage in the vitreous chamber. It was impossible to determine the condition of the fundus by the ophthalmoscope at the time. Potassium iodide and rest were prescribed and she was referred to her family physician for a general physical examination. The report of her physical examination was negative in all respects. On May 26, her condition apparently was improved. On June 28 a careful examination showed that the eye was normal except for mild conjunctival congestion and marked dilatation of blood vessels on the nasal side of the cornea. The cornea and anterior chamber were normal. In the angle of the anterior chamber between "6:30 and 8:30 o'clock" there was a brown discoloration 1 to 2 mm. wide. The pupil dilated slightly irregularly with mydriatics. The lens was clear. Vitreous was quite hazy with floating opacities. Arising apparently from the ciliary body in the lower nasal quadrant and projecting into the vitreous to such an extent that the nasal edge of the disc was just visible was a dark mass posterior to which was a detachment of the retina, grayish-white in color, quite smooth in contour. Transillumination was positive for a solid mass under the detached retina. Tension of the eye was 19 by tonometer. Diagnosis: intraocular tumor of the ciliary body, probably melanotic sarcoma. Immediate enucleation was advised. On July 2, 1930, the eye was sent to the Army Medical Museum at Washington for diagnosis. Following is a copy of the report:

"The eye was distorted when received. Melanotic mixed cell sarcoma of choroid in area of ora serrata, slightly pigmented. Deeply pigmented extension into the ciliary body. No tumor cells seen outside of globe."

Case 7. K. P., a slender, not very healthy appearing young white man of 23 years of age, came to the Infirmary August 7, 1930, complaining of headaches with nausea. He had never worn glasses. His personal history was otherwise negative. His family history was irrelevant.

Examination: Vision was R.E. 20/15— and L.E. 20/15—. Considerable conjunctival congestion was noted with mild marginal blepharitis. The right eye was otherwise normal externally. Irides were grayish or bluish hazel in color. In the left eye there were a few small dilated blood vessels near the limbus at "3:30 o'clock" on the left side. The cornea was clear, the anterior chamber normal in depth except temporally where it was slightly shallower at about "3:30 o'clock" where there was a small slightly grayish-brown bulging of the iris. This was hardly sufficient to be considered abnormal. However, during the process of dilatation with homatropin for refraction, the left pupil widened normally and equally in all directions except on the temporal side where the dilatation took place very slowly between "2:00 and 5:00 o'clock". During refraction nothing untoward was observed about the right pupil and media but when the light was thrown into the left eye a small, rather thin object appeared projecting into the pupillary area from the temporal side at about "3:30 o'clock". At first, it was thought to be a small macula of the cornea but careful examination of the cornea disproved this, the cornea being perfectly clear. The ophthalmoscope revealed a small cyst temporal to which was a brown growth directly posterior to the bulge in the iris, apparently one-half the size of a small pea, and extending above to "1:00 o'clock" and below to "5:00 o'clock"; from this there seemed to be a thickening of the ciliary body. The fundus and media were otherwise normal. The patient was kept under observation for two months during which time the bulge in the iris increased perceptibly and the growth became more obvious. The patient's general physical examination was negative. Diaphanoscopy was negative. On October 3 it was decided to perform a wide iridectomy to include the growth if possible and to examine the frozen section, then proceed accordingly. On October 4 the iridectomy was performed, a piece of iris about 3 mm. by 3 mm. being removed under local anesthesia and sent to the laboratory. The following report came back: "A frozen section was made and microscopic examination showed an excessive quantity of melanin scattered throughout the section. There was a thickened area in which the matrix was made of young forms of connective tissue cells. Diagnosis: Melanosarcoma." The patient was given a general anesthetic and the eye was enucleated and a Guist's bone sphere inserted. During the operation the globe collapsed. The eye was sent to the Army Medical Museum at Washington, D.C., and the following report was received: "Gross—Operative iridectomy, collapsed eye. No tumor seen. Histological—recent unhealed iridectomy, traumatic cataract, no tumor cells seen, but the eye has a very large amount of pigment, more than occurs in some eyes of the negro race."

The patient has been seen numerous times since his operation and to date he is in fine condition.

As stated above there seemed to be a thickening or flat growth in the ciliary body from "2:00 o'clock to 5:00 o'clock". This was the reason for enucleation. The patient had expressed his desire to have the eye removed if there was any question at all as to the possibility of removing the entire growth by iridectomy or of recurrence.

Since receiving the final report from Washington it is apparent that the growth and cyst had slightly dislocated the lens posteriorly bringing the ciliary body more clearly into view and making it appear thickened.

817 Summit avenue.

NOTES, CASES, INSTRUMENTS

A MEANS OF DETERMINING THE PRESENCE OF A MAGNETIC FOREIGN BODY IN THE VITREOUS

HAROLD F. WHALMAN, M.D.
LOS ANGELES

This clinical case is reported because of an interesting observation which was made in determining the nature of an intraocular foreign body located in the vitreous, and serves as another test for determining the presence of magnetic bodies when free in the vitreous.

A male patient aged thirty-five years who was in the desert prospecting, was breaking up some red quartz with a small hand pick when something flew into his right eye. There was a little pain and irritation and the vision soon became blurred, so he drove into the city for treatment.

Examination revealed an injected eye with a perforated cornea, full anterior chamber, a hole in the iris near the sphincter and slightly cloudy lens.

Dilatation of the pupil with atropine and examination with the slit-lamp further revealed a wound in the cortex of the lens with a trail of pigment cells from the iris scattered through to the posterior capsule which was seen to be ruptured.

A shadow could be seen with ophthalmoscope and this shadow was visible to the patient.

X-rays disclosed the presence of an opaque substance, measuring not over 1 mm. in its greatest diameter and located in the vitreous.

The question of the nature of the object arose in connection with consideration of its removal. Was it quartz, pyrites, or other fragment of ore present in the rocks, or was it a chip of steel from his pick? It was a very small piece judging from the nature of the wound.

A small magnet was applied; no sensation could be noted by the patient. It was then decided to try displacing the foreign body with the giant magnet, taking a second x-ray to show any displacement and also to test patient's sensation again.

A bright light was shone into the pupil, the tip of the giant magnet was applied to the temporal sclera and the current turned on. Immediately the patient saw a shadow fly toward the magnet, and when the current was turned off it flew back again. This was tried again with the same result.

This proved, it seemed, the presence of a magnetic body. A small piece of steel 1 mm. in length, .75 mm. in width and about .2 mm. in thickness was removed with the giant magnet through a posterior sclerotomy.

727 West 7th street.

CORNEAL DYSTROPHY ASSOCIATED WITH SCLEROSIS OF THE LIMBUS CAPILLARIES

EMORY HILL, M.D., F.A.C.S. AND
ROBERT H. COURTNEY, M.D.
RICHMOND, VIRGINIA

Within the past few months we have observed two cases of corneal dystrophy in which there was a rather marked disturbance of the epithelium with formation of bullæ, and an associated disturbance of the endothelium. It was also noted that in each case there was an extreme degree of sclerosis of the capillaries at the limbus, the capillaries in fact, appearing as fine, white threads with no visible blood column in them when viewed with the slit-lamp. The sclerosis of the vessels did not, however, account entirely for the absence of visible blood since any irritant solution such as two percent solution of holocain or two percent dionin caused a return of the circulation in part, leaving though, a white line on either side of the column of corpuscles. Following the use of such medication there was some subjective improvement in vision, but no apparent objective change.

In none of the standard atlases of slit-

lamp microscopy do we find any reference to any association between corneal dystrophy and disturbance of the circulation at the limbus. This note therefore is submitted with the desire to encourage further observation by others for an association of the conditions.

At some future time we hope to make a more detailed report on these observations with some remarks on the therapy.

Professional building.

FORMATION OF A NEW LACRIMONASAL CANAL AFTER EXCISION OF THE LACRIMAL SAC

G. H. Mathewson, B.A., M.D.
MONTREAL

In November, 1910, J. C. came to my clinic suffering from chronic dacryocystitis and we excised the sac on the seventeenth of that month. He soon came back complaining of excessive lacrimation which he said interfered greatly with the performance of his work.

On March 3, 1927, I undertook the task of re-establishing drainage into the nose. I made an incision over the former site of the sac and then excised a portion of the nasal wall. An opening through the upper part of the wound perforating the lower lid into the conjunctival sac was next made. Having thus re-established a connection between the conjunctival sac and the nose, I took a skin graft from his arm and wrapped it around a fine rubber tube tying it on at both ends. This tube was passed through the opening in the lid across the floor of the wound into the opening in the nasal wall and out the nostril. I then closed the wound by silk sutures. At the end of a week I removed the tube through the nostril. The graft took nicely.

The new canal at first became obstructed from time to time but was readily cleared by means of a probe. The man quickly learned to use the probe himself. I saw him on January 29, 1930, when he informed me that the tears gave him little if any trouble. He could by compressing his nostrils blow air and mucous through this canal into the conjunctival sac.

823 Medical Arts building.

SOCIETY PROCEEDINGS

Edited by DR. H. ROMMEL HILDRETH

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section of Ophthalmology

February 19, 1931

DR. H. MAXWELL LANGDON presiding

Congenital cataract

DR. ZENTMAYER presented a case of this condition with unusual visual acuity and pseudoaccommodation thirteen years after operation. The patient when a girl of nine years of age, was referred in May, 1917. The history of the case left it uncertain as to the type of cataract originally present. After an illness of several weeks the patient accidentally discovered that she had very poor sight in the left eye. Previous to the illness she attended school and had no trouble with her eyes.

When first examined there were diffuse opacities throughout both lenses. By November, 1917, the left lens was opaque throughout. Two needlings and a linear extraction were made. In January, 1918, under atropine, vision with a +12 D. Sph. = +1.25 Cyl. ax. 165° was 5/7. In March, 1918, without atropine, with a +12 D. Sph. it was 6/6. She read type 0.50 at 10 cm. with distance glasses.

The right lens was needled but once, in January, 1919. In April, with a +13 D. Sph. vision was 6/6 and she read type 0.75 with difficulty with this glass.

In December, 1920, vision in the right eye having fallen to 1/120, the Ziegler V shaped capsulotomy was done. Following this, vision with a +10 D. Sph. = +2.50 Cyl. ax. 105° was 6/5.

At present the patient read 6/4 and 6/3 with +10 D. Sph. = +1.50 Cyl. ax. 100° and +10 D. Sph. = +1.75 Cyl. ax. 70° respectively.

Excellent near reading vision was obtained with these distance glasses especially with lids partially closed.

There was orthophoria and isophoria for distance, and 7 degrees of exophoria at 33 cm. There was bar reading, and full binocular vision, including Verhoeff's cerebral binocular test.

Biomicroscopic examination made by Dr. Alfred Cowan: O. D.: vitreous bulging forward through the pupillary space. This was covered by an extremely thin, transparent membrane. During contraction of the pupil the curvature of this vitreous front increased, but it was unlikely that this would aid materially in her ability to see near objects. The accommodative effect seemed to be due, almost entirely, to partial closure of the lids. O. S.: the pupillary space contained a dense white sheet of remaining capsule in which there was a tiny opening. This most probably acted as a stenopaic aperature. The evidence of this was borne out by her ability to see clearly at certain times without her glasses.

Spontaneous cyst of the iris

DR. EDWARD A. SHUMWAY reported on a woman fifty-six years of age, who had been operated on for carcinoma of the rectum. The cyst of the iris had appeared within two years, and produced no discomfort or disturbance of vision. There was no history of traumatism or operation. The cyst was transparent, the anterior wall being thin and crossed by fibers representing the iris stroma; the posterior wall was in contact with the pigment layer of the iris. The cyst had forced the lower part of the iris from its ciliary border, and was in contact with the cornea below, without producing any cloudiness of that structure.

Dr. Shumway discussed the theories as to the origin of spontaneous iris cysts in the anterior part of the iris, in distinction from those developing from the epithelium of the posterior layer of the iris, and those arising from an at-

tachment of the ciliary processes to the posterior iris surface, (Tertsch's classification), all of which were to be distinguished from the more common cysts which arose from ingrowth of epithelium into the anterior chamber after traumatism or operation.

In view of the complication of a tumor of the rectum, the eye had been searched carefully for metastases, but none could be found. Dr. Shumway had decided not to remove the cyst by operation, because of the patient's age, the complicating inoperable carcinoma, and the absence of ocular discomfort.

Discussion. DR. REESE said that some time ago a case of this type appeared at the Will's Hospital and that Dr. Cowan made a diagnosis with the slit-lamp of cyst of the iris. Dr. Reese had felt that it was a tumor. There was no history of injury, as he recalled it, and the cyst differed from that of Dr. Shumway's case in that the color was consistent with that of the iris throughout. There was very definite elevation of the cornea at the site of the cyst which was practically in the same situation as in this case. He made an attempt to remove it and got into difficulty, discovering the cornea to be abnormally thin, so much so that he desisted and placed a conjunctival flap over the whole mass and the eye recovered uneventfully. He asked Dr. Shumway whether there was bulging and thinning of the cornea at the site of this cyst.

DR. SHUMWAY said that so far as he knew, thinning of the cornea had not been reported in the cases examined anatomically, but opacification of the cornea was common. In operating it was necessary to remove the entire cyst with the part of the iris involved, to prevent recurrence. With simple puncture the cyst would promptly refill.

Melanosis of the anterior uvea

DR. H. MAXWELL LANGDON said melanosis of various parts of the body was of fairly frequent occurrence in the form of moles, nevi, or plaques. It occurred mostly in brunettes, and possibly had some relation to the formation of malignant tumors, as Coates found seven instances of melanotic sarcoma in twenty-six cases of diffuse melanosis of the uvea.

Heine reported nevus and sarcoma in juxtaposition in the iris with evidence of transition from the benign to the malignant form, though Fuchs thought the change from nevus to sarcoma in the iris had not been shown with any certainty, and felt that melanosis was merely an incident of sarcomatous growths.

In the eye, melanosis was usually unilateral, and varied a great deal in its extent from a few pigmented spots in the iris to a general pigmentation of lids, sclera, and uveal tract.

The condition was very thoroughly described by Bourquin in March, 1930. Goldstein and Wexler made a most exhaustive study of a case in Mt. Sinai Hospital in New York with the microscopic report of one of the eyes. This case was associated with neurofibromatosis, many pigmented skin moles and acromegaly.

The eyes showed hyperpigmentation of the uveal tract, the posterior pigment layer being almost double the normal thickness with protrusion at the pupillary margin. Irregular masses on the anterior surface of the iris, with hyperplasia of the anterior iris endothelium and irregular pigment masses through the stroma. The pigment excess was also in the ciliary body including its processes and in the pectinate ligament. There was no evidence of round cell infiltration, new vessel formation, or karyokinesis.

The source of this pigmentation in the iris was difficult to explain. Fuchs objected to its being called pigmented nevus owing to the absence of the nevus cells; this placed the source among the pigmented fixed tissue cells. These might be the endothelial ectodermal cells or the chromatophores of the stroma which were believed by most authorities to be mesodermal in origin, and this seemed to be the most likely source.

Reese believed this to be the source of the pigment in his case of melanosis,

and Treacher Collins believed these mesodermal cells had a phagocytic property, taking up melanin from degenerating epithelial cells.

This condition was, of course, one entirely different from that of blue sclerotic where the coloration was due to the normal choroidal pigment showing through the abnormally thin sclera.

The case which was here reported was that of F. DeL. a boy aged three and one half years, the third child in a family of four children, the oldest thirteen and the youngest one month. None of the others were similarly affected, nor were the parents. The condition was noticed first about two months ago, but had probably been there for a much longer time. The pigment involved a ring of sclera from 4 to 6 mm. out from the limbus. The lids and the rest of the uveal tract were quite normal. The right eye had a brownish gray iris and seemed normal in all respects. As near as could be decided in a child of this age, the function of each eye was normal.

The affected sclera looked as though it had been peppered with pigment granules and this description also fairly well applied to the iris. The structure in daylight was a dark sooty brown with granules thickly peppered over its whole surface, the crypts entirely filled. The iris in this case, as in Friedenwald's and in several other cases, showed irregular protuberances or wart-like growths over its surface. Coates used the term "golf ball" iris, in describing a case of his. In Goldstein's case, the iris was the site of multiple melanotic nodules. In the case here reported the melanin did not seem to be in the nodules but on them, except for their topmost parts which under the corneal microscope seemed to be free of pigmentation and to resemble normal iris tissue.

Discussion. DR. DE SCHWEINITZ, who had had the opportunity of examining Dr. Langdon's and Dr. Friedenwald's patient (a girl about sixteen years of age) expressed the opinion that the lesions were probably identical in nature, although not exactly similar in manifestation.

DR. COWAN said the thing that impressed him most in this case was the gradually diminishing size of the elevations from the pupil toward the periphery of the iris. Those nearest the pupillary border were best developed. They appeared as spherical elevations with tops of fuzzy material that did not look like iris tissue and certainly was not pigment.

Radiational cataract

DRS. DE SCHWEINITZ and BAER describing radiational cataract as one which was caused by any form of radiation which was "absorbed in quantity by the lens", made reference to the three chief varieties of this lesion, namely, those due to exposure to infrared rays (glass-blower's cataract for instance), to ultraviolet rays and to radium and x-ray emanations.

This last type might be regarded as a special one and in most instances began at the posterior cortex in an oval or disc-like form, rather granular in appearance, and containing fragments of crystallized lens protein. Beneath the anterior capsule a delicate layer of opacity might form; also vacuoles. The lens structure between the anterior and the posterior cortex was at first unaffected.

Their patient's eye exhibited another complication, namely paresis of the outer half of the iris adjacent to the area originally occupied by the sarcoma. They also referred to the invariable development of epibulbar conjunctival telangiectasis as the ultimate result of the radiation, a characteristic phenomenon, as originally pointed out by Birch-Hirschfeld. They also described the development of quiet iritis in one patient successfully treated for epibulbar sarcoma by radium.

Discussion. DR. PENDERGRASS said that the occurence of telangiectasis of the conjunctiva following irradiation was usually an evidence of over-radiation. Irradiation usually caused an endarteritis obliterans of the blood vessels supplying the part, and thereby destroyed

the normal nutrition of the treated area, and in an effort to overcome this, nature formed new blood vessels.

In the treatment of melanotic lesions of the cornea the tendency was to over treat rather than under irradiate because of the seriousness of the prognosis.

In the cases reported by Dr. de Schweinitz and Dr. Baer this type of irradiation was used. Some of the rays were penetrating and some were superficial. Recently we had been employing superficial irradiation so as to prevent a possible deep effect.

It was a little difficult to explain the formation of a cataract such as that described by Dr. de Schweinitz. If the cataract was formed following a disturbance in nutrition of the blood vessels of the ciliary body one could easily understand how irradiation might produce it. He had been told that the disturbance of the blood supply of the ciliary body would not cause changes in the posterior cortex of the lens. If this was true, then one would have to explain the effect in some other way, and a possible explanation was the following: Absorption of the superficial rays would cause changes that would subsequently lead to telangiectasis. The more penetrating, or gamma rays, might be absorbed in the region of the posterior cortex of the lens, and account for the changes observed by Dr. de Schweinitz and Dr. Baer. This explanation was theoretically possible, but was probably less tenable than the changes produced in the posterior cortex secondary to the disturbance in the blood supply of the ciliary body.

Dr. Shumway said that he thought the changes in the lens might be due to the disturbances in the vessels of the ciliary body, and consequent interference with the nutrition of the posterior part of the lens, just as occurred in disease of the uveal tract in the posterior part of the eye. There were no cells lining the posterior capsule of the lens such as were present on the anterior capsule, and proliferative cell changes therefore, could not be produced by radium in this position.

Localization of tears in retinal detachment

Dr. Alfred Cowan and (by invitation) Dr. L. P. McAndrews described their method. The patient was seated at one-half meter distance from a tangent screen, and was told to rotate the eye laterally, fixing a point about 50 degrees from the center of the screen. The examiner then located the lesion with an ophthalmoscope. An assistant, with a meter stick or a piece of string, projected the line of direction, found by the examiner, back to the tangent screen. The angle found by the examiner must be corrected to allow for the bending of the rays of light. This was done by deducting one-fourth from the angle, both in the vertical and the horizontal meridians. This corrected point was now placed on the tangent screen.

To find the corresponding point on the sclera, one could use a scaled perimetric chart. The chart represented the entire retina projected onto a flat surface, its center corresponding to the fovea, and the 90 degree circle to the ora serrata. On this chart were vertical and horizontal lines, drawn 4 degrees apart. Each of these 4 degree squares was equivalent to 1 mm. on the retina. The point found on the tangent screen was transferred to this perimetric chart. Considering that the 90 degree circle corresponded to the ora serrata, and that the latter was 8 mm. behind the limbus, the correct distance of the tear from the limbus, could be quickly and accurately estimated.

Discussion. Dr. Peter said the plan submitted by Dr. Cowan and Dr. McAndrews for localizing tears in detachment of the retina was perhaps less complicated than the majority of the other methods which had been offered to us. There was no difficulty whatever in locating the tear with reference to the corneal meridian. The difficulty in all cases rested in being able to determine properly the depth of the tear.

A fact which all of these methods could not definitely determine was the location of the tear when the fluid was

withdrawn and the retina again in contact with the sclera.

If one would remember that the average disc was about a millimeter and a half in diameter, the size of the tear could be approximated with reference to the size of the disc, and by careful measuring in disc diameters from the disc forward to the tear, and remembering the size of the cornea and the distance of the ora serrata from the limbus, the location could be approximately determined without the use of any one of the many complicated methods which had been suggested.

It should also be remembered that the position of the tear in the retina when the patient was in an upright position was not the same as when the patient was in the recumbent position, as on the operating table. Any method which was employed should be practiced with the patient in the recumbent position.

A. G. FEWELL,
Secretary.

BALTIMORE CITY MEDICAL SOCIETY

Section of Ophthalmology

February 26, 1931

DR. ANGUS L. MACLEAN presiding

Some interesting experience in the clinical pharmacology of the eye

DR. DAVID I. MACHT presented, on invitation, this paper published in the American Journal of Ophthalmology, August, 1931, p. 726.

Discussion. DR. C. A. CLAPP stated that the eserine-pilocarpine solution which caused mydriasis in his patient, when used in his own eyes at first produced a myosis followed in about 15 minutes by mydriasis and an associated stimulation of accommodation.

DR. ARLINGTON C. KRAUSE said there were many possible sources of the cause of the unusual reactions of commercial pilocarpine.

First, the question arose as to the purity of the preparation derived from commercial Jaborandi leaves. There were many species of the Pilocarpus or Rue and Piper family which contained pilocarpine and many which were worthless. The Pernambuco and Maranhan Jaborandi were official in the U. S. P. IX and B.P. The name Jaborandi, however, was applied to a number of other plants in Brazil besides those of the genus Pilocarpus. The adulterants, such as "Maranhan Jaborandi" or Swartzia, Piper jaborandi, jaborandi bark or Alcornoco bark from Bowdichia irrglioides, and Piper reticulatum, frequently used might contain other unknown alkaloids which gave reactions similar to atropine. It was claimed that jaborine, a drug reacting like atropine was found in Paraquay, Jaborandi or Pilocarpus pinnatifolius, Lemaine. Apparently Jewett and others had not found it in the two species which they had investigated.

Secondly, the method of preparation was to be considered. There had been some discussion as to the effect of alkalies, acids, and heat used in the manufacture of drugs on the stability of pilocarpine. It was known that heat and alkalies caused a rearrangement of the structure of pilocarpine to iso-pilocarpine which was weaker in action than pilocarpine. Alkali split the lactone ring of the molecule and formed pilocarpic acid. Since 1-ethyl, 2-methyl imidazol reacted like atropine and pilocarpine contained a 1-methyl imidazol group, there was a possibility that a drastic method of preparation might split off or change the lactone group and leave a residual compound with an atropine reaction.

Thirdly, the reduction of the intraocular pressure by application of pilocarpine to the eye had been generally attributed to the contraction of the pupil, facilitating the escape of the fluid by allowing it freer access to the spaces of Fontana. Another factor according to Grönholm might be the contraction of the intraocular vessels which lessened the secretion. The secondary effect of other alkaloids occurring with pilocarpine might be a dilatation of the vessels.

Fourthly, there was a possibility of

an idiosyncrasy toward pilocarpine. The stimulation of the inhibitory fibers seemed sometimes to be entirely absent after an injection of pilocarpine. This, also frequently happened in man. Instead of a slow pulse and a decreased blood pressure, an increased pulse and blood pressure were observed. It was interesting to note that pilocarpine dilated the pupil of the rat. Other drugs apparently did not act paradoxically in rats. Waddell believed pilocarpine mydriasis in rats was caused by a parasympathetic paralysis.

Elements of safetv in cataract extraction

Dr. C. S. O'Brien read a paper which appeared on p. 1132, v. 14, no. 11.

Discussion. Dr. W. H. Wilmer said that it was his custom to have foci of infection removed before operation, blood sugar below 120 mg. per 100 cc., blood calcium and coagulation time normal. He felt that the preliminary iridectomy, especially when accompanied by massage of the lens, was useful and well indicated in the safety program of cataract extraction. Also the preliminary training was of great value. External canthotomy was particularly helpful in prominent or sunken eyes. In certain cases the rectal injection of avertin or the use of morphine and scopolamine was advantageous.

Dr. Ernest A. Knorr said that Dr. O'Brien's method of akinesia was practiced at the Presbyterian Hospital.

H. F. Graff,
Secretary.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

March 17, 1931

Dr. S. Judd Beach presiding

Lymphangioma of the orbit

Dr. J. I. Farrell (by invitation) reported the case of a baby, fifteen months old, first brought to the hospital in May, 1930. There was a slight swelling of the lids and slight ecchymosis nasally. He was seen again in June and August, and showed practically no change. On January 5, there was very much more swelling. This, according to the mother, had come on within the previous week. At that time, it looked like a large cyst, and the mass was soft and freely movable. The left lower lid was normal. He was admitted to the hospital with a question of lymphangioma or sarcoma of the orbit. He was given three x-ray treatments at that time, and when discharged from the hospital on January 17, the eye looked considerably better.

On February 20, he developed a cold and simultaneously the lid began to swell. There was a very great increase in the swelling the day before the patient was brought to the hospital. There was a question of pus in the upper lid, and incision was made, but no pus obtained. Four days later a Killian incision was made because of a question of orbital abscess, but again no pus was found. At this time a biopsy was done, and the pathologists reported chronic inflammatory tissue. It was felt that this tissue was taken from an irradiated area. Two days later, he was given a blood transfusion of 250 cc. He then developed a respiratory infection, and further x-ray treatment had to be delayed.

Beginning March 8, he was given four deep x-ray treatments on consecutive days. The day after the last treatment, the swelling of the lids had lessened but since then the lids, nose and cheek had become more swollen. In the last two days, the swelling of the nose had become a little less. One week ago, the lower lid looked as though it would break down, which it did, and drained pus for three days.

Exfoliation of the anterior layer of lens capsule with secondary glaucoma

Dr. Frederic H. Verhoeff reported the case of a patient who came to him two weeks ago complaining of poor vision in the left eye. After the pupils were dilated, it was found that the patient had marked exfoliation of the anterior layer of the lens capsule in each eye. Both optic discs showed glau-

comatous cupping, and there were some pigment changes in both maculæ. The visual field was concentrically contracted to ten degrees in the left eye, but was practically normal in the right. The tension was 30 to 34 Souter, 40 to 49 Schiötz. Under miotics, the tension was now normal in the right eye, but still high in the left.

Statistics from the literature showed that about 75 per cent of the cases with exfoliation of the lens capsule had glaucoma, and that in 150 cases of chronic glaucoma, the lens capsule showed this exfoliation in 75.

Hemangioma

Dr. Virgil G. Casten (by invitation) showed a female patient, aged seventeen years, who has had difficulty with vision for the past three years. She had severe headaches and blurred vision three years ago, and within a little over a year, had to be led around. Finally, she developed complete loss of vision. She was sent to the nerve ward for observation. She developed a soft place in the vertex of her skull. At about the time this was discovered, she was greatly relieved from her headaches. She had one and one-half diopters of papilledema in both eyes, with complete optic atrophy. An x-ray of the skull showed that both the inner and outer tables of the skull were completely eroded. In January, Dr. Holmes felt that he could make a positive diagnosis of hemangioma. Since vision was only fingers at one foot in each eye, and very small temporal fields remaining, it was thought the condition might be a binasal hemianopsia, but this diagnosis proved to be incorrect. It had not yet been decided what to do with this patient.

Keratomalacia together with post mortem findings

Dr. H. B. C. Riemer reported the case of a white, six months' old infant, who was admitted to the Massachusetts Eye and Ear Infirmary on January 10, 1931; transferred to the Massachusetts General Hospital on January 16, and died of broncho-pneumonia on February 17.

At birth, the baby weighed eight pounds, two ounces, and appeared normal. He was breast-fed for three months and then weaned to a formula of milk, water and dextri-maltose. Never was given cod liver oil. Had nine drops of viosterol daily. Orange juice was given, somewhat irregularly, in one or two ounce quantities. There had been only one previous illness, a mild gastro-intestinal upset while he was teething. The baby never gained well, and always appeared underweight. He ate well, however, and at one time took eight ounces of food prepared from a formula at a feeding without any difficulty. His weight had increased to eleven pounds.

Six weeks before entry, the mother noticed spots on the eyes, which were treated by a local medical doctor without results. At the same time, he seemed suddenly to lose a great deal of weight, and the appetite failed. There had been no vomiting or diarrhea.

Physical examination on admission showed malnutrition. The corneæ of both eyes showed central ulceration. The right cornea was perforated. Bulbar conjunctiva was dry, showing a typical xerosis. There were no Bitot spots. Physical examination otherwise, was negative. Blood was negative, as was also mother's Wassermann.

On January 20, examination showed: right eye, xerosis of bulbar conjunctiva; central opacity of the cornea; perforation of cornea below the center; iris caught in perforation; anterior chamber fairly well formed. Left eye, central opacity of the cornea; very shallow anterior chamber.

Report from the clinic showed that he did not feed well, and continued to lose weight. Lavages were tried with some improvement. Stools were bulky and putty colored. On January 27 he passed unaltered cod liver oil. The stools were loaded with fat. He did not gain any weight and his eye condition did not improve. Februray 11, patient had a temperature of 102. Dullness and rales were made out in left upper chest. He began running a septic temperature between 101 and 99. He developed râles

throughout the chest, and died on February 17.

Necropsy findings: The muscles were atrophic. There were multiple lung abscesses; broncho-pneumonia; nephrolithiasis; keratomalacia; emaciation; congenital abnormality of the gall bladder; chronic pancreatitis; and cystic dilatation of pancreatic ducts.

The interesting pathological findings here were in the gall bladder and the pancreas, which probably accounted for the keratomalacia. The gall bladder was atrophic and about one-sixth the normal size. It contained a small amount of thick clear mucous. The cystic duct was very narrow and a small probe could barely be passed through it. The pancreas showed no acinous tissue whatever. Islands of Langerhans were present in normal numbers and were normal in character. The remainder of the pancreatic tissue was made up of greatly dilated ducts, some of which contained hyalin masses showing a tendency to concentric ring formation which were often suggestive of prostatic "corpora amylacea" The interstitial fibrous tissue was denser than normal and, in some areas, showed lymphocytic infiltration. The question arose whether or not the narrowing of the cystic duct of the gall bladder might not have been due to a hyperplasia which might occur in keratomalacia in all mucous membranes, and whether or not the condition of the pancreas might not have been due to a similar cause blocking the main duct, thus shutting off the secretion from the pancreas.

Dr. Riemer remarked that he thought this case beautifully demonstrated that keratomalacia was due to a disturbance in fat metabolism or lack of fat in the food.

Angiomatosis retinæ, two cases

Dr. Allen Greenwood reported the case of Miss I. B., aged thirty-four years, who lost sight of right eye following operation seventeen years ago. Records of the late Dr. Myles Standish showed that she came first with history of blurred vision and examination showed a section of the retina separated. This was soon followed by an attack of acute glaucoma. An iridectomy was performed but there was no restoration of vision. Four months ago, she noticed a blur over the left eye which had increased slightly since. Examination showed the right eye blind, with evidence of the old operation. Left eye had vision of 20/50. Examination with the ophthalmoscope revealed that the arteries and veins running both up and down were tortuous, dark colored, and more than triple the natural size, especially the veins. The upper vessels progressed up and out until lost in a rounded elevated area that had a cystic appearance, and around which the vessels passed. This cyst was in the equatorial region on the extreme edge of the visible retina. The lower vessels extended tortuously down and out and just before they passed to the area not visible with the ophthalmoscope, they disappeared at the edge of a separated retina which was elevated four diopters. This area of separated retina did not look like a cyst, nor as though there was fluid beneath it.

A diagnosis was immediately made of hemangioma, and the patient referred to Dr. Harvey Cushing for neurological examination to determine whether there might be a cyst of the cerebellum such as has been found in some of these cases. Dr. Cushing reported no brain cyst.

The second patient was Miss E. B., cousin of the first patient, aged twenty-two. This patient was practically blind in both eyes. The following history was taken from the records of the Massachusetts Eye and Ear Infirmary where she was sent August 10, 1922. "Diagnosis: Retinitis (unclassified); for observation. Family history: Mother died of diabetes. Father living and well. Two brothers and three sisters living and well. One brother paralyzed by accident in army. Past history: At five years of age patient had severe infection from vaccination. Mumps at about four years. No subsequent sickness. Menstruation began at fourteen years,

regular, 3 to 4 days duration. No dyspnea or edema. No nocturia. First noticed left eye nearly blind one and one-half years ago. Both eyes were straight until about four years ago when squint, left eye, was first noticed. Right eye has been all right until one week ago when patient noticed loss of vision. No night blindness. No haloes.

"Physical Examination: The external examination of the eyes is negative throughout except for a slight internal trabismus of the left eye. Fundus examination: right eye vitreous filled with fine opacities. (No descemetitis). The disc margins are blurred, especially on the temporal side. The inferior temporal vein and artery are of tremendous size. The nasal vessels appear more normal. The superior temporal vein and artery are of normal size. The retina shows only a few changes to the nasal side of the disc. Beginning at the temporal side of the disc and extending to the periphery, temporally, the retina shows marked pathology. In the immediate region of the disc, the retina has a punched-out appearance with alternating red and white areas. There is no exudate present but the retina is spotted with white areas. Extending from about one disc diameter to the temporal side, and in the area, roughly, between the superior and inferior temporal vessels, and to a point just beyond the region of the macula, the retina shows marked deep exudate with cholesterin crystals. The retinal vessels pass over this area and appear not to be affected. This area of retinal involvement is bounded above by a fairly straight line at about the base of the macula. The location of the macula could not be made out with certainty. At the approximate location of the macula there is a small area, about the size of the disc, which shows pigmentary changes. With the exception of this small area, the remains of the central area described are practically white. The periphery of the fundus, temporally, inferiorly, and superiorly shows the same type of change as that seen to the temporal side of the disc for one disc diameter: a spotting of the fundus with white areas, and some pigmentary changes which are not marked. One hemorrhage was noticed along the inferior temporal vessel.

"In the left eye, the disc cannot be seen. Only a small area shows any red reflex. The vessels in the areas seen appear fairly normal. The remains of this fundus picture consist of white appearing substance showing a dark line here and there. There are no vessels apparent on this exudate.

"Provisional diagnosis: tuberculosis or syphilis, right eye; retinitis proliferans, left eye."

Another record of this patient made September 7, 1922, stated: "Today patient has a separation of the retina, temporal side of right eye. It is quite evident from the history that this patient has lost both eyes as a result of hemangioma of the retina."

Dr. Greenwood stated that the diagnosis of hemangioma of the retina had not been frequently made, but it was evident from a study of the literature that this diagnosis could be made more frequently, and undoubtedly would be in the future because of the reports of Lindau, and also Dr. Cushing and Dr. Bailey. It was evident, however, that the disease was an extremely rare one.

Dr. J. Herbert Waite reported the case of D. S., aged fourteen years, male, who first discovered poor vision in his left eye about eighteen months ago, when the eye began to water. There had been no history of ocular trauma or inflammation, and the patient was unaware of any reduction of vision in any member of his family.

The right fundus and right visual field were normal in all respects. The left field was contracted concentrically about twenty degrees, and it showed a large central scotoma connecting with the blind spot, and involving the field out to the ten degree circle. The ocular tension was normal and there was no gross or slit-lamp evidence of intraocular inflammation. The vision was fingers at two feet, unimproved. The fundus examination revealed a gray detachment of the retina temporally, in-

creasing in altitude from the disc outward, and seen best with lenses increasing to plus ten diopters. Surmounting the detachment temporally, there was a globular "strawberry" body, and numerous clusters of exudate, without hemorrhages. Coursing from disc to the "strawberry" body, and there disappearing by plunging into it, were greatly distended and tortuous superior and inferior temporal vessels. Dr. Waite said the superior set was made up of the largest retinal vessels he had ever seen, and that the artery was scarcely to be differentiated from the vein in appearance or size.

Having in mind the multiplicity of angiomatous lesions, an attempt was made to discover any other possible focus, but without success. X-ray of the skull failed to reveal any abnormality. Neurological examination was completely negative. No abnormality could be found in a general physical examination.

It was believed that this case exemplified an angioma of the retina (v. Hippel's disease), and a periodic search would be maintained to ascertain whether it also fell in the category of angiomatosis of the central nervous system and viscera.

Discussion. Dr. George S. Derby said that Dr. Cahill's two cases were cousins; and Dr. Derby saw the cousin of Dr. Bedell's case, a girl thirty years of age, who was blind in both eyes and showed a late stage of Coates disease. He said that he felt sure there was familial tendency in these cases of Dr. Cahill's and Dr. Waite's.

James J. Regan,
Recorder.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section of Ophthalmology

April 10, 1931

Dr. John Brown presiding

Pathology of superficial punctate keratitis

Dr. Walter E. Camp (Minneapolis) read a paper on this subject and showed several lantern slides of pathological microscopic sections.

Discussion. Dr. W. L. Benedict (Rochester) said he had recently examined a case of bilateral punctate keratitis with the slit-lamp; the condition was quite advanced and white spots were discrete, as the spots seen in cerulean cataract. The condition had existed in this case for more than a year and followed respiratory disease. Several years ago Dr. Gradle reported a few cases of this disease which were somewhat different from those described by Fuchs.

Dr. Benedict thought it was rather difficult to understand why the spots in Dr. Camp's cases should take the fluorescein stain unless there was a break in the superficial epithelium. Unless necrosis was quite advanced, Dr. Benedict was of the opinion that staining did not occur, early cases were unquestionably not stained by ordinary staining methods.

He said he was interested in the opinion that this was due to a neurogenic condition; certainly the localization would lend itself to this view. Recently zoologists had done some work on the secretion of nerve endings. He believed there was very good evidence that there was a secretion of nerve endings that had an action somewhat similar to adrenalin. Dr. Benedict said that so many of the reported cases of superficial punctate keratitis would not fit this description, that it was a question whether most of the reported cases were not miscalled. He thought the presence of leucocytes was evidence of irritability and was inclined to think it secondary rather than primary; he would think the plasma cells would come out first and the leucocytes afterwards.

The slit-lamp appearance was quite characteristic, and he thought it should not be confused because all the white spots were posterior to Bowman's membrane in the anterior third of the cornea. The fact that the cornea was so clear between the spots indicated a noninflammatory process. There was some tendency for the spots to coalesce.

Dr. W. W. Lewis (St. Paul) asked about how frequently superficial punctate keratitis had been seen here. He stated that when he came away from Vienna after his preparatory work in ophthalmology, he thought it was quite a common condition and when he came home he expected to find a large portion of the cases he would see would be superficial punctate keratitis. Personally, he thought he had not seen more than two or three cases here.

Dr. Camp (in closing) said, in regard to staining with fluorescein, the two cases he had seen both stained, one very well and the other only slightly. He agreed with Dr. Benedict that there must be some alteration of the epithelium to allow the stain to penetrate. Dr. Camp felt that the cases Dr. Grant mentioned were probably not identical with the superficial punctate keratitis as shown in the slides. His cases more closely resembled those of so-called disciform keratitis when the opacity was due to proliferation of the corneal corpuscles. Verhoeff was treating these pathologic lesions of the cornea, or at least he was a few years ago, with holocain with good results.

Walter E. Camp,
Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY

April 18, 1931

Dr. F. L. Beck presiding

Aniridia and cataract

Dr. J. L. Swigert presented a man forty-two years old whose complaints were poor vision and pain in the right eye. Since birth the patient had had poor vision. The vision of both eyes had apparently been equal until September, 1930, when that of the left eye had begun to fail more rapidly. He had been able to continue working about the farm, as evidenced by heavily caloused hands, until April 8, 1931, when, while out in a sandstorm, something had seemed to blow into the right eye. A foreign body had been removed and the patient had been told that he had cancer of the eye. He was sent to the Colorado General Hospital, April 10, 1931.

On examination, the right eye showed moderate blepharospasm and conjunctival injection. There was a mucopurulent discharge, and marked infiltration and vascularization of the cornea. An area about 2 by 4 mm. over pupillary area stained with fluorescein. Vision light perception and projection. In the right eye the cornea appeared quite opaque and somewhat vascularized. On transillumination there was no evidence of an iris, there being only a dark ring in the position of the ciliary body. With the slit-lamp the beam, however, passed through the cornea and seemed to be reflected from what was thought to be a cataractous lens, which had approached close to the posterior surface of the cornea. Vision light perception. The fundus of neither the right nor the left eye was visible.

The ulcer on the right eye rapidly yielded to treatment. It was then noticed that nystagmus and convergent squint were present, right eye fixing. Slit-lamp examination of the right eye yielded no evidence of an iris, but showed an opaque mass which seemed posterior to the lens. The anterior chamber appeared quite deep.

Discussion. Dr. D. H. O'Rourke said that it was remarkable how people with poor vision could carry on if they had the will to do so.

Dr. Wm. M. Bane mentioned a case of glaucoma that he had operated on in which a supposedly very opaque cornea had cleared almost instantaneously when section of the cornea allowed the egress of a milky aqueous.

Dr. Wm. H. Crisp said that he would question the amount of vision if any compensation were involved.

Drs. C. E. Walker and Melville Black urged surgery on each eye in an attempt to remove the lens remnants.

Melanosis of the iris

Dr. Phillips Thygeson presented Mr. B. T., a barber, aged forty-two years, who came to the clinic at the

University of Colorado Medical School for refraction. In the routine examination a marked difference in the pigmentation of the two irides was noted, the left having a melanosis involving mainly the lower and temporal quadrants; only a small area in the upper quadrant corresponded exactly to the greenish blue of the right iris. At one point on the pupillary margin the pigmentation was so intense as to merge completely with the black of the pupil, giving the effect of a coloboma of the iris.

The fundi were normal and vision standard in each eye. There were no spots of pigmentation in any other part of the eye. The patient stated that the eye had been this way since he could remember and had undergone no recent change.

Discussion. Dr. Edward Jackson believed the condition might become malignant, but inasmuch as most of these remain unchanged for many years he advised watchful waiting. It was only when these pigmentations began to grow rapidly that there was danger of spreading out of the globe. Most iridectomies had been unsuccessful.

Dr. Wm. H. Crisp in discussing a method of handling the case if the pigmentation began to increase, called the attention of the society to the case reported by Luedde in which a malignancy of the ciliary body had been cured by the use of the thermophore.

Intraocular foreign body

Dr. V. H. Brobeck presented K. C., twelve years old, whose case of copper in the vitreous was reported at the last meeting. The piece of copper had been removed March 23 from the vitreous with difficulty through a scleral incision. Under direct observation with the ophthalmoscope, the foreign body had been grasped with forceps. The partially collapsed eye had been injected with salt solution and the sclera sutured. The eye had not been very red before the operation, but since then there had been a considerable reaction with softening. The iris was now green and there was a greenish hue in the pupil (healthy eye blue). Vision was light perception.

Discussion. The members agreed that the eye should be removed.

Ralph W. Danielson,
Secretary.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

April 21, 1931

Dr. S. Judd Beach presiding

The use of fascia lata in an extensive keratocele

Dr. Henry M. Emmons reported a case which was published in the October number of this Journal, p. 1014.

Coates' disease in a child

Dr. Edwin B. Dunphy reported the case of a child, ten years of age, of whose former history nothing was known, due to the fact that she was an inmate of a home. She did not see very well with the left eye, and stated that she never had.

Examination of left eye showed a patch of exudate just below the retinal vessels, directly in the macular region, which seemed to be elevated over the rest of the fundus. The exudate extended down below the disc, but the disc itself seemed normal. The blood vessels were normal. Down in the extreme periphery of the fundus there were several elevated white areas. There were also several hemorrhages in that area below. The rest of the fundus seemed to be made up of yellow flecks throughout.

Vision of the left eye was light perception. The physical examination showed nothing. All tests were negative. Cardio-renal-vascular system seemed to be all right. There were no signs of congenital lues. Dr. Dunphy said that he didn't know what diagnosis to make, but thought it belonged to a group of Coates' disease.

Atypical retinitis pigmentosa

Dr. Hugh Donohue (by invitation) reported the case of a boy, ten years of

age, who had always had poor vision. There was no family history of similar trouble, and he had no other defects. Three sisters and two brothers were perfectly normal. He came to the hospital several years ago in order to have his vision improved, and had been coming during the past two years. With a —4.00 D. Sph., he had 20/200 vision in each eye.

Upon examination of the fundus, the discs were found to be white, the vessels contracted and small. There was some distribution of pigment. The fields were normal but, in view of the findings that were shown in both fundi, he was demonstrated as a case of retinitis pigmentosa. He had all the symptoms of retinitis pigmentosa without the distribution of pigment.

Post-neuritic atrophy; two cases

Dr. Virgil G. Casten (by invitation) reported the case of the seventeen year old American-Canadian girl shown at the last meeting as a case of bitemporal hemianopsia. He said that since then she had had a cerebellar exploration. A glioma which connected the bone defect in vertex and fourth ventricle was found. It contained cystic fluid (total protein 4920 mg.). The removed tumor was about the size of a golf-ball. The patient's condition was very good. Her eyes remained unchanged.

Dr. Casten also presented the case of a twenty-two year old Vermont section-hand who came to the Massachusetts Eye and Ear Infirmary two weeks ago complaining of blindness for a little over four months. The patient gave the following history. Last October he began to notice failing vision, and two weeks later had to give up work and return home. He began treatment with a chiropractor who said he needed his "nerves straightened out". He never had any headaches, nausea, or vomiting.

Examination at the infirmary revealed old choked discs, with marked secondary optic atrophy, both eyes. Pupils reacted, but there was no light perception in either eye.

X-ray of skull showed separation of the sutures and signs of increased intracranial pressure. A cerebellar exploration was done by Dr. John Hodgson, but no tumor was found. Neurological Diagnosis: Paralysis of associated movements upward; some cerebellar ataxia; questionable facial paresis, left side.

Syphilis and the eye

Dr. John Stokes of Philadelphia read a paper on this subject.

Discussion. Dr. C. Morton Smith said that bismuth had come into use almost entirely since he left the Massachusetts General Hospital Clinic, but he had used it in private practice with great success and the type of preparation made very little difference. Dr. Smith believed that the earlier treatment was started the better, and the general care counted just as much in the treatment of syphilis as in any other contracted diseases. He began by giving arsphenamine and mercury, and approved of the smaller doses.

Dr. Stokes said that the infant in surviving uterine life must have had enormous resistance to the infection. It was known that the pregnant state was antisyphilitic in action. Taken altogether, there was a peculiar immunity. It was undecided whether syphilis in the infant should be treated as late, rather than early, syphilis. Neurosyphilis in the child could be cured more easily than in the adult. The only severe syphilitic lesion in which Dr. Stokes urged the use of powerful arsphenamine was interstitial keratitis.

In the case of a child of syphilitic parents there was considerable difference of opinion as to treatment. With a positive Wassermann, when treated they grew better. If they had to have their tonsils out, there was less danger for them if they had had treatment. Also they should be treated because of the importance in their general health, with the possibility that it might avert later complications.

Dr. Stokes said that what we expected to accomplish in the treatment of interstitial keratitis was primarily to protect the other eye, to demonstrate

that the other eye could be protected; secondly, to reduce the infiltration and head off the vascularization at the earliest possible period. We knew that we would fail to some degree, but if we treated a case early and intensively we reduced the damage.

Late syphilis should never be treated at the outset with arsphenamine. This was a uniform rule of my clinic, he said, and we were proud to say that we had not had a single Herxheimer reaction in six years. All established cases of syphilis were prepared by the use of bismuth, and none of them were given arsphenamine at the outset.

JAMES J. REGAN
Recorder.

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SUBJECTIVE TESTING OF REFRACTION

This is the most widely used, most generally relied on, method of measuring the refraction of the eye. It is the method capable of the most minute accuracy. Yet by it are chosen many glasses that fail to give relief; or that do actual harm to the eyes they are intended to help. The optician has heard it was the best method. It was the only method of his famous predecessors of a hundred years ago, who knew more about the refraction of the eyes than the physicians or surgeons of their time. But the traditional method of the opticians was very different from the systematic subjective testing of refraction, by the educated oculist of today.

Dr. George C. Harlan used to say: "The test lenses are the supreme court to decide questions of refraction." And they are a final tribunal if, like the supreme court, their decision is based on all the trials that have preceded them. Such a method guided by large experience in similar cases may reach a correct judgment. Its failures are due to following traditional methods, without the knowledge, experience, and precautions, that would exclude errors. But there are subjective tests that reach a certainty and exactness that were unknown a century ago. The two kinds are both spoken of as "subjective testing", but they are totally different.

The older optician had only spheric lenses from which to choose, with such large intervals between the successive lenses that there was little chance of uncertainty as to a choice between them. From the statements of the customer he judged whether convex, or concave lenses were wanted, and guessed about what strength was worth trying. Then he brought out lenses of that kind and let the buyer choose those he liked best; giving, perhaps, some supervision and suggestions, to promote a trial of those most likely to suit. If a trial of those chosen proved them unsatisfactory, others could be substi-

tuted for them, until some were found that could be accepted. The plan of "trial and error" was given full opportunity to reach the desired result.

When astronomers and mathematicians introduced cylindrical lenses, which were not only convex and concave, but had an axis that must be turned to a certain meridian, the method of trial and error became too complicated to be practical. When the medical profession awoke to the fact that errors of refraction might cause disease, not only of the eye and related parts, but chronic conditions like headaches, dyspepsia and malnutrition, they began to use the ophthalmoscope, the ophthalmometer and muscle tests, while the opticians turned their attention to mass production and high-power salesmanship. Although opticians, and oculists who supplement their incomes by commissions for the glasses they prescribe, practice what they call subjective testing; it is more like the traditional testing by the opticians of the last century, than the plan of exact scientific measurement, which has been a gradual development of modern ophthalmology.

Scientific subjective testing starts with what is known of the physiology and psychology of vision, and all that has been learned by objective measurement of refraction by the ophthalmoscope, the ophthalmometer and skiascopy. With this approximate knowledge, it sets out to make the measurement exact, by systematic tests of each detail that is to be known. With the cross cylinder it first fixes exactly the principal meridians of astigmatism and then the amount. Then, with all the details and precautions that have been grouped under cyclodamia (p. 498), it seeks the amount of hyperopia, or myopia; making the conditions of illumination and adaptation as nearly as may be like the conditions under which the eyes will have to be used. Finally, the determinations are each repeated, until the possible errors of a single test, or a few tests, have been eliminated.

The importance of detecting and eliminating by repeated tests, the errors of a single test, is well understood by engineers and physicists, who are accustomed to making measurements that are mathematically exact. Such repetitions are of great importance in the testing of refraction. They may seem superfluous to the man who is only selling glasses or to the surgeon who thinks the details of an operation are the only important details; yet they assume their true importance in the mind of one who seeks to make scientific measurements with exactness, and understands that this is necessary for the correction of errors of refraction, and for relief from the important symptoms and disabilities that they cause.

Edward Jackson.

VISUAL PROGNOSIS AFTER HYPOPHYSEAL OPERATIONS

The forlorn hopes of surgery present to the surgeon fine questions of judgment and opportunities for courageous and tactful expression of opinion. It is often necessary to declare that the patient must die in a relatively short time if he is not operated on; that he may die sooner if he is subjected to operation; and yet that his chance of material prolongation of life is much greater with, than without operation. Such opinions should be expressed only after most deliberate and honest consideration and consultation. As a rule, the responsibility for recommending operation should not be taken unless the balance of chance is distinctly in favor of recovery with improvement; although let us not hesitate to admit that it may sometimes be a kindness to the patient to encourage him to take what the surgeon knows to be a desperate risk, since protracted helplessness and suffering are sometimes greater calamities than early death.

The blessing of relief by a fatal outcome is seldom greater than in the case of a patient with hypophyseal disease who faces the prospect of life afflicted by complete blindness. The clinical picture in many of these cases is none too encouraging as to the ultimate preservation of useful vision; and in the pres-

ence of restricted fields and greatly reduced visual acuity, in association with the ophthalmoscopic picture of optic atrophy, we may occasionally wonder whether the surgical game is worth the candle.

Yet, heavy as the percentage of operative and postoperative fatalities still remains, developments in technique have improved the foundations of hope for those patients and their anxious relatives or friends. Moreover, as pointed out by de Martel, Monbrun, and Guillaume (Archives d'Ophtalmologie, 1931, volume 48, page 529), conclusions must not be drawn too positively as to the extent to which the prognosis may be judged from the degree of pallor of the optic discs or the amount of limitation of the visual fields.

These authors cite a series of cases to illustrate the extent to which fields and visual acuity may recover, and often the normal color of the optic discs may be regained, after skilful operation. In one case of large suprasellar tumor, approached by the intradural route, both optic nerves were already in an advanced stage of atrophy. Yet the vision of the right eye, which had been lowered to detecting hand movements, improved to a record of two-tenths, while the left eye, which had not even had light perception, regained approximately one-tenth of normal acuity.

The term "optic atrophy" implies degenerative lesions which do not permit recovery of function. But it is suggested by de Martel and his collaborators that the pallor of the disc is not in direct ratio with the amount of atrophy of the nerve fibers, but is rather related to an ischemia from compression of the vessels of the chiasm and of the optic nerves. In a number of cases, after surgical intervention, the pallor of the discs disappears in the course of a few weeks.

Even where, during operation, the surgeon finds an optic nerve which is genuinely atrophic, to the extent of being filiform, vascularization of the disc is frequently reestablished, although functional recovery is manifestly not to be looked for. It seems likely that the pressure of the tumor is exerted more upon the arteries than upon the nerve conductors themselves, so that the situation is more or less analogous to what occurs during arterial spasm within the brain. If the ischemia does not last long enough to cause definite anatomic changes, the functional disturbance will prove transitory, while on the other hand the functional defect may become permanent even though the artery recovers its permeability.

While certain types of tumor seem to be improved, at least temporarily, by the action of x-rays, there are other tumors, especially chordoma, suprasellar meningioma, and tumors derived from Rathke's pouch, which are not susceptible of improvement under such treatment; and without operation it is unfortunately not possible to determine the exact character of the tumor. Surgical treatment is naturally more apt to be successful in the early than in the late stages of the disease.

W. H. Crisp.

CHRONIC UVEITIS

In this number of the Journal appear some of the papers read at the second annual meeting of the Association for Research in Ophthalmology held in Philadelphia on June 9, 1931. The symposium constituted a most interesting and very comprehensive survey of the subject of chronic uveitis.

The first paper was a historical review. It was followed by other contributions containing exhaustive studies from many different angles.

Of what practical value is this work to the clinician? There seems to be agreement as to the commonest causes of chronic uveitis, namely focal infections, syphilis, tuberculosis and a smaller heterogeneous group which includes sympathetic ophthalmia, acute exanthemata and auto- or chemical intoxication. From the papers the ophthalmologist may get an inkling of how to proceed in the study of this disease.

An idea as to the relative frequency of each cause would be most desirable

but the essayists feel that they cannot give this because it varies tremendously depending on the class of patients, their races and their geographic location. For example, tuberculosis as an agent may be four or five percent of the total in private practice in the United States or forty percent in a European clinic. Syphilis may be six percent at Rochester, Minnesota, or fifty percent in a largely colored clinic in the South. Therefore we must be content to do without the help of even approximate statistics of the possibilities and turn in each case to the study of the patient as an individual in this search for etiologic factors. According to the essayists some such procedures as the following should be used in the search.

Focal infections

Following the teaching of Rosenow apical dental abscesses should be sought as well as chronically infected tonsils and prostatitis or cervicitis. Cultures should be made in glucose-brain-broth media and rabbits or guinea pigs inoculated intraperitoneally or intravenously with the growth. If the animals develop an ocular reaction and no other cause for the infection has been found in the patient, the focal infection from which the growth was obtained is almost certainly the cause of the uveitis. An autogenous vaccine should be made from the growth from the infected rabbit's eye and the patient treated with this; though possibly later researches may show that a hyperimmune serum will prove more effectual. The focal lesion in the patient should be removed if possible or if this is impossible it should be treated.

Syphilis

A general physical examination should be made to note any possible evidences of syphilis such as scars of healed ulcers, nervous system lesions, Hutchinsonian teeth or other manifestation. Floculation tests of the blood such as the Kahn and Kleine should be done and if syphilis is suspected and the patient is under sixty years of age the spinal fluid also ought to be tested. If found positive, antiluetic treatment should materially help about one in three of these patients and slightly help another third.

Tuberculosis

This diagnosis can be positive in few cases, only in those in which a section can be made and an animal inoculated intraocularly or intraperitoneally or cases in which nodules, in the absence of sympathetic disease, lues and lepra are seen in the iris. The reaction to tuberculin is not regarded by Finnoff as entirely conclusive nor would one judge from his paper that it had sufficient value to make it worth doing as a routine. Greatest dependence for a positive diagnosis of tuberculosis must be placed on the clinical picture, especially in the absence of other causes. Greasy gray deposits on the endothelium of the cornea are very suggestive, as are the nebulous, round gray balls of exudate on the iris. General and tubercular therapy, plus local treatment to the eye, seem to offer the best hope in these cases.

Other causes

The group caused by intestinal infections must be eliminated by stool examination; the history of recent exanthemata is suggestive; the possibility of sympathetic disease or intraocular tumors as etiologic factors when their presence is discovered is fairly obvious.

Conclusions

If we accept the suggestions of the contributors to the symposium, for the complete study of a case of chronic uveitis all these tests should be done to determine the probable etiologic factors and to eliminate the improbable. This, it must be admitted, will not prove so very simple but such studies as these are extremely illuminating and instructive. They come as near to unearthing the fundamentals of the problem as is now possible and much credit and many thanks should go to those who have devoted so much time and effort to these researches. *Lawrence T. Post.*

FIFTY YEARS OF THE CRÉDE PROCEDURE

In 1881, fifty years ago, Karl Sigmund Franz Créde described his method for prevention of ophthalmia neonatorum. It is fitting that some attention be drawn to this physician on the semicentennial of this important contribution to human welfare.

In commemoration the St. Louis Society for the Blind offered the Robert Johnston prizes for 1931 for the two best essays on the subject of the Credé procedure. At a meeting of the St. Louis Medical Society on October 20, these prizes were awarded by Dr. O. H. McReynolds of Dallas, Texas, who was chairman of a committee for selecting the winning essays.

In his address Dr. McReynolds accented the great decrease in external ocular inflammations but the increase of the intraocular, largely degenerative diseases, and explained this as due to the greater number of people who attained old age.

The prize essay containing much of the history of the discovery and slow acceptance of the method was read.

Thereafter followed an interesting discussion from the points of view of the ophthalmologist, the obstetrician, the State Board of Health, and the institutions for the blind.

There has been a reduction by half in the incidence of ophthalmia neonatorum throughout the country. The number of those blinded by this disease who have sought admission to the Missouri School for the Blind in the past ten years as compared with the number entering in the previous ten years shows a similar percentage reduction.

Most of the states have introduced measures for prophylaxis of neonatorum. Early legislation usually provided merely for the reporting of new cases but later laws have required the use at birth of some drug approved by the State Health Boards. The improvement has been remarkable.

From the obstetrician's point of view there is a real value in maternal antiseptic vaginal douches and swabbings if either parent is known to have gonorrhea. Routine smears are not so illuminating as those taken at periods of activity of the vaginal inflammation. Records of the last three years show only one case of ophthalmia neonatorum in a thousand deliveries in the out-patient department of one hospital and the same number in five thousand deliveries in this hospital over a period of four years.

Though the improvement has been great, much more should be done, since ophthalmia neonatorum is almost entirely preventable. To accomplish better results is fundamentally a legal problem. It is necessary to appoint intelligent and courageous legislators and members of Health Boards; not such as the governor of one of our most populous states who with colossal unenlightment recently vetoed an excellent measure for prophylaxis of ophthalmia neonatorum after this bill had been passed by House and Senate. All physicians must campaign for good legislation; must continue to instruct legislators and laymen on this important subject and before many years have passed this disease will have become one of the medical rarities.

Lawrence T. Post.

BOOK NOTICES

Handbuch der gesamten Augenheilkunde (Graefe-Saemisch Handbuch): founded by A. Graefe and Th. Saemisch, continued by Th. Axenfeld and A. Elschnig. Part 2, volume 5, chapter 6_2, Diseases of the uveal tract, continued, by W. Gilbert. 255 pages, 77 illustrations in the text. Paper covers, 59.60 marks. Verlag von Julius Springer, Berlin, 1931.

This is merely a continuation of the sixth chapter of the fifth volume of the second part of the second edition of the Graefe-Saemisch Handbook of Ophthalmology. The name of Axenfeld appears on the cover, although he had been dead for a year or more at the time of publication. The present volume is virtually a review of the literature of that part of the subject dealt with. Ap-

pearing so irregularly, the Handbook must necessarily be relatively up to date in its later volumes and out of date in its earlier sections. In many respects a good year book would be much more valuable to the reader, although the liberal inclusion of illustrations is a valuable feature of the Graefe-Saemisch series. One is led again to marvel at the price paid in Germany for publications of this kind, the present small paper-covered fragment costing about $15.00. The fact is that works of limited circulation, especially with illustrations, cannot be issued at low prices, and the tendency of a large proportion of those who practice specialties in the United States is to expect too much for their money, or to be unwilling to pay for good medical literature. It was this spirit of false economy which killed the Ophthalmic Year Book, and the basis of which lies perhaps in a rather widespread inability to appreciate the value of good medical periodicals and the need for supporting them loyally.

W. H. Crisp.

Accidentes oculares del trabajo, suprevision (Ocular accidents of labor, their prevention) by Dr. Atilio Tiscornia. Paper covers, 60 pages, liberally illustrated. Imprenta Mercatali, Buenos Aires, 1931.

This monograph consists chiefly of reproductions of a great variety of posters for displaying in factories with the object of encouraging workmen to take proper steps for prevention of accidents. There are also illustrations of various types of protective spectacles. The work was presented to the first international American Ophthalmological Reunion, at Santiago de Chile.

W. H. Crisp.

Ophthalmic Section, Department of Public Health, Egypt. Annual Report of 1929. Paper, quarto, 42 pages, 2 illustrations, Cairo, Government Press, 1931.

This 17th annual report consists chiefly of tables and statistics. The latter give the frequency of different forms of ocular disease among 381,790 new patients and operations done on 171,487 patients. Among the patients there were 31,893 blind in one eye and 8,697 blind in both eyes. There were 4,692 cases of glaucoma, of which 373 were acute or subacute, 1,583 chronic and 2,737 absolute. The principal operations were iridectomies 877, and Elliot trephinings 1,190. For cataract 2,150 operations were done, the operation of selection being combined extraction. There is a list of the sixteen papers given at the meeting of the Ophthalmic Society of Egypt, which occurs at the Giza Memorial Ophthalmic Laboratory in March. Monthly reports of interesting cases are received from the ophthalmic hospitals and of these a list of 180 is given. There is a map of the lower Nile valley, giving the location of the ophthalmic units, also a graph showing the temperature and number of new patients treated each month. In this section of the health department there are 31 permanent ophthalmic hospitals and 14 traveling units.

The pathological report from the Laboratory at Giza included 692 eyes. The wealth of clinical and pathological material recorded in these tables from year to year is classified and recorded on a uniform system, giving an excellent basis for estimating the frequency of different eye defects and diseases. Certain conditions that furnish a large part of the practice of western ophthalmologists are in Egypt, conspicuous by their absence. Against the more than 40,000 cases of blindness encountered there were 1,563 spectacles ordered.

Copies of the report may be obtained from the sale room of the Ministry of Finance, Egypt. Correspondence relating to these publications should be addressed to the Publication Office of the Government Press, Bulaq, Cairo.

Edward Jackson.

OBITUARY

Konrad Kristian Karl Lundsgaard was born in Silkeborg (Jutland) on August 20, 1867. At the conclusion of his medical study at the university Prof.

Oscar Wanscher, at the time surgeon and oculist at Copenhagen, advised young Lundsgaard to take up ophthalmology. After a short stay as a volunteer assistant with Hansen Grut and Bjerrum he became a clinical assistant with Christensen (1897-1902) and after this, from 1902 to 1904, he served as a reserve-surgeon to the surgical-ophthalmological department of the Frederiks Hospital under Professor Wanscher. Having concluded this specialized training he started in practice and at the same time became head of the Frederiks Hospital Clinic and oculist to the Finsen Institute. Both positions he kept until he was appointed professor in 1925.

In about seventy scientific publications Lundsgaard proved his interest in all branches of ophthalmology. Apart from this professional study, public life never ceased to attract him. His membership in many professional associations and scientifical societies is a striking corroboration of this inclination.

The gold medal of the Copenhagen University awarded to him for his treatise on "The inflammation of the eye of new-born infants both from a pathogenic and a therapeutic point of view" proves that his scientifical work was highly appreciated. This was followed in 1900 by his thesis "Bacteriological studies on conjunctivitis." Bacteriology henceforth captivated his attention. His publications on the flora of the conjunctiva give evidence of this, and it was on this account that he was invited in 1927 to deliver the "Doyne Memorial Lecture" at Oxford. He published clinical papers on "Hemeralopia in alcoholics". "Refraction anomalies in case of diabetes". "Paralysis of eye muscles in infants", and others. He also worked in the field of surgical ophthalmology and among other things constructed a trephine for sclerectomy and a keratome. As regards therapeutics, he specially occupied himself with optochin treatment and with the effects of parenteral milk injections. He did epoch-making work with light treatment in ophthalmology, having been the first to apply the Finsen method in diseases of the eye and he constructed the necessary set of instruments for this treatment.

The history of ophthalmology also attracted his attention. He was a collector of old spectacles and wrote a monography on the history of these useful instruments.

In the year 1929 a Scandinavian Manual of Ophthalmology published his study on the affections of conjunctiva and orbit. His collaboration with others resulted in the foundation of the journal "Dansk Klinik" and from 1919 to 1925 he was co-editor of "Nyt Medicinsk Aarskrift" and of "Hospitals Tidende". He deserves much credit for starting the "Acta Ophthalmologica", which periodical has since attained great popularity.

Professor Lundsgaard

As a professor he succeeded Tscherning, who however, on Lundsgaard's request continued his labours in the laboratory for physico-ophthalmologic research. Lundsgaard was a tutor much beloved by his students. He was a very clever and interesting lecturer and steadily fascinated his audience.

Traveling was among his hobbies and during his trips he came in touch with many of his colleagues abroad. So he became a co-editor of the journal "Klinische Monatsblätter" edited by Axenfeld.

Apart from his work, art and especially plastic art, attracted him and more than one of his articles sets forth the relation between the eye and artistic perception.

The great confidence his colleagues put in him became apparent when, at the first international conference of ophthalmologists after the great war (1927) he was appointed vice-president of the International Council, founded on that occasion, and was elected president in 1929. Alas! it was only given him to preside at one session of the International Council!

This brief enumeration of the principal data in Lundsgaard's life, however, does not give in the least a faithful image of the excellent man Lundsgaard proved to be on all occasions. He was amiable and helpful to all those who came into contact with him, full of new ideas and projects for the work of the International Council. It is a pity that he saw the realisation of only a few of these schemes. We will endeavour to develop the Council's work in Lundsgaard's spirit and we always will remember him as an excellent collaborator and a man of an extremely high character. Dr. Lundsgaard died August 30, 1931, at Copenhagen. *E. Marx.*

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history

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1. GENERAL METHODS OF DIAGNOSIS

Gifford, S. R., and Mayer, L. L. **The clinical use of the Sander pupilloscope.** Arch. of Ophth., 1931, v. 6, July, pp. 63-69.

The essential part of the Sander pupilloscope is a gray glass plate 22 by 72 mm. in size, the upper half of which is a uniform dark gray, transmitting only 2.3 percent of the light. The lower half, on the other hand, is graduated from a light gray, transmitting 52 percent, to the same dark gray as that of the upper half. Behind this is mounted a 0.4 ampere 3.5 volt lamp with a slit aperture and a collecting lens. The whole is mounted in such a way that it can be raised and lowered so that the light may pass through different portions of the glass screen. A scale along the upper edge of the glass plate is divided into twenty-one spaces. When set at 1, the maximum difference in the light intensity is present, when set at 21 there is no difference. The normal eye reacts to the intensity of light as transmitted between 16 and 19. By this instrument very delicate reactions to light, both direct and consensual, can be determined. The authors feel that its use adds greatly to the possible information which may be obtained with regard to the pupillary apparatus, and permits of checking accurately, so that the progress of the condition may be noted. Lesions may be discovered earlier than by previous methods.

M. H. Post.

Gifford, S. R., and Mayer, L. L. **Retained pupillary reactions with no perception of light.** Arch. of Ophth., 1931, v. 6, July, pp. 70-74.

The vision of the left eye had been lost at the age of five years through an injury. The right eye was normal. The left showed a shrunken white cataract, with a small corneal scar below the center. There was no perception of light in the left eye on repeated testing, but the pupil reacted to convergence and both directly and consensually to light, as observed with the Sander differential pupilloscope. This reaction was found to correspond to 19 on the scale, a normal reaction. The right pupil, furthermore, reacted consensually to light thrown on the left eye, even when that light corresponded to 19 on the scale. The authors feel that aside from central lesions of the reflex arc alone, and bilateral cortical blindness, cases occur that indicate different mechanisms for vision and for pupillary reaction respectively.

M. H. Post.

Lauber, Hans. **The advantage of intense sources of illumination for ophthalmoscopy.** Zeit. f. Augenh., 1931, v. 74, June, p. 223.

For ophthalmoscopy the light must be uniform, not too small, and sufficiently intense. It is astounding to note how much more can be seen in vitreous opacities, detached retina, and other conditions, when light intensity is increased. For a seventy-five watt lamp which he formerly used he has substituted a point-o-lite lamp, and he can now see fundus details through a pupil contracted by pilocarpin. With a 3000-watt lamp and also with point-o-lite he often found retinal tears not visible with less light. Such a lamp, placed 70 cm. from the ophthalmoscope behind a 30 mm. diaphragm, has a light intensity of 1200 to 1500 lux, yet it is borne by the patient with comfort. With intense light the mirrors and lenses must be absolutely dust-free. For general routine ophthalmoscopy the point-o-lite lamp is best, for particularly unfavorable conditions the 3000-watt lamp. Opacities of the media are best seen with a plane mirror to which is attached a magnifying lens. *F. H. Haessler.*

Lauber, Hans. **A low voltage lamp for red-free ophthalmoscopy.** Zeit. f. Augenh., 1931, v. 74, June, p. 229.

The author describes a lamp manufactured by Zeiss which consists essentially of the slit-lamp nitra lamp bulb with filter and condenser on a suitable stand. To get sufficient intensity the lamp must be next to the patient's temple and must be used with maximum voltage. Then one sees nerve fibers, very fine vessels, and the color of the macula, though this seems more brownish than with the light of arc or sun. *F. H. Haessler.*

Linksz, A. **A new exact method for quantitative determination of fluorescein in high dilution.** Arch. f. Augenh., 1931, v. 104, July, pp. 470-489.

In the use of fluorescein in experimental ophthalmology, one difficulty encountered has been its quantitative determination in high dilution. Linksz found that with Kleinmann's nephelometer the fluorescein content could be accurately determined in solutions of from 1 to 100,000 to 1 to 10,000,000. Determination with the nephelometer is simpler and more rapid than by methods heretofore employed. This instrument can be used in a study of aqueous where the colorimeter frequently fails. *Frederick C. Cordes.*

2. THERAPEUTICS AND OPERATIONS

Arnould, G. C. **Antigenotherapy in ocular tuberculosis.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 624-632.

This study is devoted to a tubercle bacillus extract, an antigen demonstrating the properties of complement fixation. In diagnosis its value equals that of the Bordet-Wassermann reaction for syphilis, but in the presence of a negative reaction the test should be repeated two or three times at intervals of eight to ten days because periods exist during which antibodies are not present in the blood. The extract has been beneficial in treatment, being given in courses of ascending doses injected subcutaneously. The effect has been good in local and general tuberculosis. Reactions are few and without danger. There are no contraindications. Several cases are briefly reported. *H. Rommel Hildreth.*

Gasteiger, H. **Effect of Bucky's border rays on bacteria pathological to the eye.** Arch. f. Augenh., 1931, v. 104, July, pp. 399-404.

Gasteiger reports the effect of Bucky's border rays on the cultures of the various bacteria pathological to the eye. He found that these rays had no inhibitory effect on the growth of such bacteria. *Frederick C. Cordes.*

Gasteiger, H., and Hauptmann, W. **Effect of various etherial oils on organisms pathological to the eye.** Arch. f. Augenh., 1931, v. 104, July, pp. 404-416.

Recently, certain oils have been recommended for ophthalmological practice and especially in the treatment of serpiginous ulcer. Gasteiger and Hauptmann have experimented on the inhibi-

tory effect of such oils on cultures of organisms pathological to the eye. They found that oil of cinnamon and oil of cassia were the most effective even in relatively high dilutions. They were, in fact, more effective than the highly recommended oil of wintergreen. Chaulmoogra oil was found to be among the least effective of the various oils. *Frederick C. Cordes.*

Levine, Joseph. **Nonspecific protein therapy: advantages of Coley's mixed toxins.** Arch. of Ophth., 1931, v. 6, July, pp. 75-78.

Coley's mixed toxin consists of a "mixture of toxins, derivatives from killed cultures of staphylococcus erysipelatis and bacillus prodigiosus grown separately, then mixed, and finally diluted to a definite strength as determined by the percentage of protein contained." The author has found it practical to use this solution in a clinic, permitting the patients to return home, but warning them of the probable onset of a chill, followed by fever, about four to four and one-half hours later. There is no headache nor vomiting. Occasionally, there is local inflammation. Coley's mixed toxin has been used in cases of acute iritis, uveitis with keratitis punctata, corneal abscess, corneal ulcer, vitreous opacities where there was no discernible uveal lesion, and postoperative iridocyclitis.
M. H. Post.

Poleff, L. **The effect of adrenalin in local immunization of the eye.** Arch. f. Augenh., 1931, v. 104, July, pp. 464-469.

Poleff found that subconjunctival injection of staphylococcus bouillon filtrate produced to some degree immunization against subsequent staphylococcus infection of the conjunctiva. The degree of immunization was much greater if adrenalin was added to the filtrate. The greater degree of immunization produced by the addition of adrenalin is probably due to the fact that adrenalin inhibits somewhat the absorption of the immunizing agent and consequently permits it to remain longer in contact with the tissue to be immunized. *Frederick C. Cordes.*

Schmidt, K. **Variations of blood volume of the rabbit's eye as influenced by barium chloride and adrenalin.** Arch. f. Augenh., 1931, v. 104, July, pp. 427-440.

Schmidt measured the effect of barium chloride and adrenalin on the blood volume of the rabbit's eye by means of a radioactive indicator previously described. Barium chloride caused a maximum miosis and an increase of intraocular tension but a decrease in blood volume. Adrenalin caused mydriasis, decreased intraocular tension, and increased blood volume. Schmidt ascribes this phenomenon to the condition of the blood-vessel walls. *Frederick C. Cordes.*

Schmidt, K., and Günther, P. L. **Measuring the blood volume of the rabbit's eye by means of a radioactive indicator.** Arch. f. Augenh., 1931, v. 104, July, pp. 417-426.

In a rather technical paper, Schmidt and Günther describe a method of measuring the blood volume in rabbits' eyes by the use of a radioactive indicator. In their work, they injected intravenously a solution of ThB, a disintegration product of the thorium family. *Frederick C. Cordes.*

Wolfe, O. R., and McLeod, J. **Atropin dermatitis; an unusual case associated with erysipelas.** Jour. Amer. Med. Assoc., 1931, v. 97, Aug. 15, p. 460.

In the case reported (one of preliminary iridectomy and cataract extraction), the unusual severity of the reaction to atropin together with the past history of erysipelas raised the question of the possibility of a residual or latent infection with streptococcus erysipelas. That the patient had an idiosyncrasy toward atropin is certain, as shown by the rapid onset of lid edema and redness after its use, and as confirmed by the result of skin tests. The sharp delimitation of the swelling and

its recurrence in almost identically the same area, coupled with the history of erysipelas, the response of the first attack to streptococcus antitoxin, the failure of atropin to excite exacerbation of the swelling during the first attack, and the occurrence of hordeola following first and last attacks, clearly suggest latent erysipelas as a factor; and the authors feel that such an unusually severe reaction can be explained only on the basis of a marked atropin idiosyncrasy producing a reaction in an area of skin already damaged by an attack of erysipelas or harboring a residual infection. *George H. Stine.*

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Blatt, Nikolaus. **Crises of accommodation in tabes.** Graefe's Arch., 1930, v. 125, p. 236.

Ten years after acquiring lues, a man thirty-four years old showed signs of tabes in the primary stage. In addition to gastric crises, there were spasms of accommodation on two to four days of each month, two to three times a day, and lasting two to four hours. There was reflex fixation of the pupil with tabetic anisocoria, although both pupils plainly reacted to convergence at the height of the accommodative spasm. This accommodative spasm, like other tabetic crises involving a smooth musculature which is functionally highly differentiated, can best be explained as a disturbance of the parasympathetic-sympathetic double innervation, in which a parasympathetic stimulus from the vagus occurs simultaneously with weakness of the sympathetic. *H. D. Lamb.*

Dor, L. **A new international optometric chart.** Arch. d'Opht., 1931, v. 48, July, p. 465.

Attention is called to the variation in visual acuity necessary for the perception of various letters upon the usual chart, and a new chart is suggested which consists of only black circles and squares upon a white background. The construction is such that ability to discern the angles upon the squares is a measure of acuity. The chart is worked out in the metric system and is suggested as an addition for international and illiterate use. *M. F. Weymann.*

Manes, A. J. **Surgical treatment of myopia.** Arch. de Oftal. de Buenos Aires, 1931, v. 6, Jan.-Feb., p. 23.

The author has done intracapsular lens extractions to control the progressive or alleviate the very high types of myopia. These eyes also undergo a shortening of the anteroposterior diameter, with some flattening of the cornea. In selecting cases, eyes with brown or dark irides seem to give fewer complications. Eyes showing severe macular lesions or synchysis should not be subjected to operation, nor should any patient who has developed a retinal separation in the other eye. The technique followed is essentially that of Elschnig, using capsule forceps assisted by pressure with a strabismus hook. Nine cases are reported with favorable results. *A. G. Wilde.*

Pollak, Franz. **Observations on the human eye kept alive artificially.** Graefe's Arch., 1930, v. 125, p. 220.

As soon as possible after death, the entire contents of the orbit were removed through the opened cranial cavity. With a canula in the ophthalmic artery, an entirely indifferent solution of Congo red was injected so as to wash out all blood-clots and to make the finest arterial branches visible. All arterial branches were tied with the exception of the ciliary arteries. Through the same canula, filtered Ringer's solution (NaCl 9.5, KCl 9.2, $CaCl_2$ (dried crystals) 0.4, $NaHCO_3$ 0.1, distilled water 1000) was injected. Exit of the irrigating solution took place through a canula in the vein. In this way the muscles within the eye and those in the blood vessels could remain active for from several hours to a day after the death of their owner. The musculature of the iris demonstrated its response to adrenalin and eserin by characteristic changes in width of the pupil, although the reaction to electrical

stimulus had not so far been obtained. During the artificial irrigation, the blood vessels of the eyeball reacquired their ability to respond and they reacted typically to doses of adrenalin and eserin. From these observations the author felt that he was justified in expecting to obtain from this preparation conclusive findings regarding the muscle of accommodation.

H. D. Lamb.

4. OCULAR MOVEMENTS

Herzau, Werner. **The clinical aspect of unilateral and bilateral ophthalmoplegias of peripheral origin.** Graefe's Arch., 1930, v. 125, p. 207.

Causes of ophthalmoplegia include: (1) mechanical disturbances; (2) inflammatory conditions which may extend from processes in neighboring structures such as the sphenoidal sinus; (3) in much the greatest number of cases, tumors which spread from surrounding structures into the sphenoidal fissure. Particularly important are tumors of the pharynx and of the nasal sinuses, especially of the sphenoid, which first attract attention through orbital symptoms after the growth breaks through the bony wall of the sinus. The histories of three cases are briefly given, in which on one side there gradually occurred a paralysis of the third and sixth cranial nerves with ptosis and fixed pupil, diminution of sensation in the first and second branches of the trigeminal, little or no exophthalmos; these symptoms leading to the diagnosis of invasion of the sphenoidal fissure by tumor. The very rare occurrence of ophthalmoplegia as the first sign of tumor of the hypophysis was noted in a man of thirty-two years.

Ptosis or diplopia through paralysis of the external ocular muscles was the first sign in the author's cases. The abducens and oculomotor nerves appear to be involved before the trochlear. The third nerve fibers going to the pupil remain as a rule the most resistant. When they are injured the light reaction is affected before the convergence reaction. All the clinical changes may to a certain extent show remissions.

H. D. Lamb.

Lacarrère, L. J. **Congenital ocular torticollis.** Ann. d'Ocul., 1931, v. 168, July, pp. 563-570.

A discussion of extraocular muscle changes in relation to head tilting is given. The case of a twenty-month-old boy is reported. The head was tilted to the left, and in this position binocular single vision was maintained. Bending the head to the right caused an internal deviation of the left eye. Vision was apparently normal in each eye and the only other defect was a fine horizontal nystagmus. The possibility of the abnormality being of vestibular origin is raised. Before surgical intervention in congenital torticollis the ocular muscles should be carefully studied.

H. Rommel Hildreth.

Myers, I. L. **Conjugate deviation of the head and eyes.** Arch. of Otolaryng., 1931, v. 13, May, p. 683.

This paper is based on a study of twenty-four cases of abscess of the brain, all of which showed conjugate deviation of the head and eyes. In all of these cases the final diagnosis was established either by operation or by postmortem examination. The deviation is exceedingly valuable as a help in making the diagnosis and in localizing the abscess.

In abscess of the cerebrum, the deviation when present is toward the side of the lesion. It is extreme in extent when the lesion affects the angular gyrus; it is moderate if the lesion affects the posterior part of the frontal lobe; it is absent, no matter how extensive the lesion, in abscess of the prefrontal region of the frontal lobe, in abscess of the occipital lobe, and in abscess of the temporal lobe.

In abscess of the cerebellum nystagmus is toward the side opposite the lesion when the labyrinth on the same side as the lesion is destroyed. It is toward the side of the lesion when the labyrinth is functioning. The deviation of the head that is frequently observed

in abscess of the cerebellum corresponds in direction to that of the quick component of the nystagmus.
M. E. Marcove.

Thometz, H. M. **Ocular muscle imbalance.** Illinois Med. Jour., 1931, v. 59, May, p. 344.

The author explains in a very simple manner his method of procedure for testing muscular imbalance. A case is cited in which, after refraction, the patient complained of pain in the neck and eyes. An exophoria of 2.5 degrees was found. Muscle exercises failed to correct this imbalance but a one-diopter prism base in, in each eye, produced relief. *M. E. Marcove.*

5. CONJUNCTIVA

Angelucci. **The glandular treatment of trachoma.** Bull. et Mém. Soc. Franç. d'Opht., 1930, p. 124.

Angelucci in this and previous writings has described trachoma as an adenoid syndrome. As evidence for this he cites the work of Rossi, who has shown that in chronic trachoma there is a drop in the alkalinity of the blood and secretions, associated with marked leucopenia. After healing occurs the blood chemistry and leucocyte count return to normal. These are the same phenomena observed in children having exudative diathesis.

Ordinarily, trachomatous children show marked activity and hypertrophy of the tonsils, particularly of the tonsil of Luschka, and operative removal of these has often led to spontaneous healing of the disease, particularly evident where the cornea is involved. Angelucci does not exclude a bacterium or filterable virus as the primary cause of trachoma, but does consider that adenoidism produces a suitable terrain for the invader. *Phillips Thygeson.*

Blegvad, O. **Boeck's sarcoid of the conjunctiva.** Acta Ophth., 1931, v. 9, p. 180.

Boeck's sarcoid is a disease characterized by formation of nodules consisting of epithelioid cells and occasional giant cells. It affects principally the skin, but also the bones, and the mucous membrane of the nose, pharynx, and tonsils. Ten percent of the reported cases were accompanied by iritis or iridocyclitis. Involvement of the conjunctiva on the other hand is very rare, only five cases being on record. Among twenty cases treated at the Finsen Institute during the last few years no iritis or iridocyclitis could be demonstrated, but three cases had involvement of the conjunctiva. In one case the palpebral conjunctiva was very nodular; there was no cicatrization, but a few strands of symblepharon caused some entropion and trichiasis. The other two cases had nests of small clear nodules in the tarsal conjunctiva close to the transitional fold; there was some secretion, but no subjective symptoms. On microscopic examination of excised pieces of tissue from each case the nodules were seen to consist of nests of lymphocytes and epithelioid cells. There were no typical giant cells nor necrosis. (Photographs of the patients and photomicrographs of the sections.)
Ray K. Daily.

Cuénod, and Nataf, R. **Biomicroscopy in a case of conjunctival tuberculosis.** Arch. d'Opht., 1931, v. 48, Aug., p. 541.

A patient aged seventeen years had an affection of the conjunctiva diagnosed as tuberculous by the method of guinea-pig inoculation with tissue from the affected areas. Biomicroscopic observations were made during the progress of the condition and the different stages of evolution of the lesions are described in detail.

The initial lesions were more numerous in the conjunctiva of the lower culde-sac and consisted of small shining white points which grossly might have been mistaken for trachoma follicles. Under the microscope they appeared as depressed necrotic points. Near the periphery of each was a small yellow granule invisible to the naked eye. These necrotic points gradually became surrounded by follicles and granulation tissue until, at the final stage, there was present a cauliflower granu-

lation 1 to 2 mm. in diameter, of which the necrotic point was the center.

By the use of the biomicroscope these early tuberculous lesions can be easily differentiated from the follicles of trachoma. *M. F. Weymann.*

Fischer-Ascher, M. **Etiology of trachoma.** Arch. f. Augenh., 1931, v. 104, July, pp. 441-450.

Using Noguchi's method, Fischer-Ascher examined bacteriologically sixty cases of clinical trachoma and five cases of follicular conjunctivitis in children. In eleven cases of trachoma, an organism was isolated that in every way corresponded to Noguchi's bacillus granulosis. None was isolated in the cases of follicular conjunctivitis. Of the isolated organisms, six strains were cultured through many generations. Because of the difficulty in growing the organism, no conclusions can be drawn from the small percentage of positive cultures from the cases of trachoma.

Complement fixation and agglutination tests led to no diagnostic results. Skin tests with killed and live suspensions showed no difference in reaction as between trachomatous and trachoma-free patients. An attempted inoculation of nine apes was successful only in two cases, and in these a strain obtained from the Rockefeller Institute was used. In these apes, a chronic conjunctivitis was produced accompanied by follicles and papillary hypertrophy. In one of the apes, the control eye became secondarily infected. From both eyes the organism was recovered. The conjunctivitis produced in the animals did not correspond in its course or clinical picture with trachoma. But one cannot for this reason rule out bacterium granulosis as the agent of trachoma. It is possible that apes are not capable of developing a typical trachoma or that the cultures may have lost their virulence.

Frederick C. Cordes.

François, J. **Hematology of trachoma.** Arch. d'Opht., 1931, v. 48, Aug., p. 549.

The blood picture of fifty trachomatous individuals was studied and tabulated. The first group of twenty was in the follicular stage, while the second group of thirty was in the cicatricial stage. Both groups showed a slight tendency toward anemia. In the second group there was a definite tendency toward an increased white cell count with a relative increase in lymphocytes. In both groups a neutropenia was found, while an eosinophilia manifested itself in seventy-five percent of the first group and in twenty-five percent of the second group.

From the blood picture, trachoma may be considered as a local disease, and the writer is tempted to conclude with Sgrosso that it is "a chronic evolution in a lymphatic constitution."

M. F. Weymann.

Granstrom, K. O., and Larsson, S. **An unusual case of keratoconjunctivitis with Parinaud's syndrome, transmissible to rabbits.** Acta Ophth., v. 9, 1931, p. 94.

The author reports a case of unilateral keratoconjunctivitis of one month's duration in a patient ten years of age. The ocular symptoms were: edema of the lids, greyish exudate on the conjunctiva, superficial corneal infiltration of the dendritic type, and mild iritis; these were accompanied by slight elevation of temperature and swelling and tenderness of the preauricular glands. Microscopic examination of the conjunctival exudate was negative for microorganisms; culture of the exudate and conjunctival secretion resulted only in a growth of staphylococcus albus. Six eyes of rabbits were inoculated with the macerated secretion, by subconjunctival injection or by direct inoculation of the cornea, which was previously denuded of epithelium. The eyes of the rabbits reproduced the clinical picture of the disease, it being most severe in the eyes inoculated by subconjunctival injection. The secretion of the rabbit's eye was reinoculated into other rabbits for six series, showing that there was no diminution in the virulence of the virus. Attempts

to determine the nature of the virus were unsuccessful. Inoculations with macerated secretions passed through a Berkefeld filter were negative. The agglutination test of the patient's serum for tularemia was negative.

Ray K. Daily.

Lazar, N. K. **Types of ophthalmia neonatorum not due to the gonococcus.** Arch. of Ophth., 1931, v. 6, July, pp. 32-38.

The percentage of such cases as compared to those due to the gonococcus varies in different reports. In the author's series of eighty cases, thirty-six were of gonorrheal origin, fourteen were negative on scraping and culture, thirteen were due to the pneumococcus, three to the staphylococcus, three to mixed organisms, and one to the Morax-Axenfeld bacillus. In ten cases organisms were found on either scraping or culture, but not on both. Clinically those negative for both ran a mild course of a few days, starting from the second to the twelfth day. The pneumococcus cases appeared from the second to the fifteenth day. They showed no corneal involvement. Those from staphylococci and mixed infection ran uneventful, mild courses. The case due to the Morax-Axenfeld bacillus was protracted and resulted in corneal involvement in one eye. Six cases showed inclusion bodies. Three of these showed no organism, one pneumococcus, one Morax-Axenfeld bacillus, and one a mixed infection. *M. H. Post.*

Lijo Pavia, J. **Reaction of the bulbar conjunctival lymphatics to tuberculosis.** Arch. de Tisiologia, v. 7, no. 1.

This contribution summarizes the ocular manifestations incident to systemic tuberculous infections, and presents one case, with an enlarged photograph as well as stereophotographs that show the condition in detail. The author concludes that the reaction of the conjunctival lymphatics should be considered analogous to that which produces the phlyctenule, and also the diffuse form of disseminated follicu-

losis. These formations seem intimately connected with the immunization process against tuberculosis.

A. G. Wilde.

MacCallan, A. F. **The epidemiology of trachoma.** Brit. Jour. Ophth., 1931, v. 15, July, p. 369.

In the introduction the author discusses the history, the chronicity of the disease, and disabilities resulting from trachoma. The definition of trachoma includes MacCallan's four stages of the disease: (1) pinhead follicles; (2) large follicles, papillary enlargement, and added complications; (3) beginning cicatrization; (4) cicatrization completed.

Epidemiology is discussed under these headings: etiology, geographical distribution, infectivity, climate, racial predisposition, social conditions, and prophylaxis. Under etiology many theories are discussed. The author states that until the alleged specific organism has been isolated in Egypt, the home of trachoma, judgment must be suspended. The incidence of the disease varies markedly in different countries. In the early stages infectivity is high but it decreases as cicatrization progresses. Infection occurs most frequently at birth or shortly afterward, yet no age is exempt. The prevalence of the disease is influenced largely by the question of whether the country is or is not heavily trachomatized. Social conditions are a greater factor than altitude. As to temperature, the hot season in Egypt shows an increased number of cases, yet in parts of Poland, a cold country, the disease is practically universal. *D. F. Harbridge.*

Morax and Nida. **Comparative study of certain strains of Bacterium granulosis.** Rev. Internat. du Trachôme, 1931, v. 8, July, p. 136.

Morax and Nida studied comparatively three strains of Bacterium granulosis, one a Noguchi isolation, the second isolated by Olitsky, and the third by Lumbroso in Tunis. The Lumbroso strain differed in producing a

bright yellow colony, while the other two developed colonies had a greyish color. None of the strains produced lesions after subconjunctival injections in the chimpanzee, and no agglutination occurred with any of three trachomatous sera tested. Using the complement fixation test with serum from rabbits which had been immunized against the two Rockefeller strains, no reaction was produced with the Lumbroso antigen. *Phillips Thygeson.*

Morax, V. **Bacteriological researches on trachoma in Algiers.** Rev. Internat. du Trachôme, 1931, v. 8, July, p. 133.

Using the special blood-sugar agar and semisolid leptospira medium of Noguchi, Morax was unable to recover Bacterium granulosis from cases of trachoma in Algiers. Only comparatively small numbers of bacteria developed in the cultures, indicating that in spite of complete lack of hygiene the ocular mucous membrane harbors no more germs in North Africa than in Europe. *Phillips Thygeson.*

Morax, V., and Jeandelize. **Difficulty in diagnosis of papillary trachoma.** Rev. Internat. du Trachôme, 1931, v. 8, July, p. 134.

A case of trachomatous conjunctivitis of papillary type resisted diagnosis because of its abnormal and painful onset, its evolution, its unilaterality for more than a year, and finally because of the persistent absence of corneal complications. Trachomatous treatment proved remarkably effective, causing in less than three months complete disappearance of lesions which had persisted without modification for more than a year. *Phillips Thygeson.*

Mylius, K. **Cysts and cystlike structures in the conjunctiva bulbi.** Zeit. f. Augenh., 1931, v. 73, March, p. 348.

This article discusses the nonmalignant cysts of the conjunctiva. Cysts may be grouped into four classes according to their general pathology: (1) those due to exudation and extravasation, (2) those due to softening and liquefaction, (3) dilatation and retention cysts, (4) parasitic cysts. For the conjunctiva a further group should be added—those based on an inflammatory origin. In the first group belong the implantation cysts which usually follow trauma or operation near the limbus, due to imbedding of epithelium into the wound. They can at times attain huge proportions. Most common of all is the lymph cyst, which is a dilatation cyst. The author discusses a cyst of particular interest which he illustrates with a case report. In a sixty-seven-year-old patient with cardiovascular disease there was found in the conjunctiva a triangular well vascularized lesion, grayish-yellow in color, riddled with numerous small cysts. Postmortem microscopic examination of this lesion showed subepithelial clumps of cells with cystic cavities between. These cavities were spread out like fibers below the epithelium. Aside from these cysts there were also solid nests and strands, all of which doubtless originated from the solid cell complexes. The development of the cystic cavities was of interest. At first epithelial cell masses showed small clefts which gradually widened into irregular cavities containing finely granular masses and cast off cells. Eventually larger tubular cavities with a wide lumen resulted. They were delimited from the sclera by two to three layers of epithelium anteriorly but only a single layer of round cells. Often the epithelial lining did not form a closed ring, so that strictly speaking one was dealing with a false cyst. Free in the lumen or within the epithelium were often found homogeneous round or oval structures which contained an oval center that would not take a nuclear stain. In differential diagnosis the first thing to think of is a cystic nevus. The author agrees with Wolfrum that nevus of the conjunctiva includes (1) pigmentation of basal epithelium, (2) disappearance of protoplasmic striation of epithelial cells, (3) budding of solid and cystic epithelial processes and separation of single cells, (4) circumscribed cell masses in subepithelial connective tissue. Loosening of epithelial

connections is of special importance. The case here reported is not one of cystic nevus. It is related to diseases otherwise only found in the urinary tract, such as cystitis and cystic pyelitis. It is characterized by changes in subepithelial connective tissue, possibly based on a chronic inflammatory process. The condition may be called cystic conjunctivitis. *F. H. Haessler.*

Olitsky, P. K., Knutti, R. E., and Tyler, J. R. **The effect of secondary infections on experimental trachoma.** Jour. Exper. Med., 1931, v. 53, May, p. 753.

The authors have succeeded in producing a condition closely resembling the florid type of human trachoma by introducing secondary infections in monkeys. These animals had already been inoculated with human trachomatous material or with cultures of Bacterium granulosis. The organisms used were some of those found in the conjunctival sac of monkey and man with different types of granular conjunctivitis. Of themselves, these organisms produced only a transient reaction or none at all. When inoculated together with material containing Bacterium granulosis, they did not affect the usual action of this organism, but, when introduced into the conjunctiva in which granulosis lesions were already well developed they induced more of the characteristics of the florid stage of trachoma than have hitherto been observed in animals. *M. E. Marcove.*

Peters, A. **Trachoma—teachings of past and present.** Zeit. f. Augenh., 1931, v. 74, June, p. 209.

The author believes that the entire adenoid tissue and not only the follicle carries the tendency to scar formation, for the conjunctiva tarsi, where real follicles are rare, is the seat of most of the scarring. The author knows of no evidence that the permanent population of Mecklenburg is ever infected by the transient Polish harvesters who have trachoma. The decrease in trachoma in some areas is probably due to improvement of living conditions rather than the result of any active campaign. It is not necessary to require physicians to report trachoma. This has no value other than statistical, and statistics will be inaccurate because of the uncertainty of diagnosis. *F. H. Haessler.*

Puscariu, Elena. **Incipient trachoma. Cicatrization and recurrences, their diagnostic value.** Rev. Internat. du Trachôme, 1931, v. 8, July, p. 159.

Puscariu states that in Roumania incipient trachoma usually appears in a mild form, secondary infections being rare. Pannus appears only late. The first changes of the disease appear in the superior cul-de-sac, in its nasal half, about 3 to 5 mm. behind the upper border of the tarsus, as a short irregular chain of follicles. At this moment no modification of the tarsus itself is visible. As the disease progresses the chain of follicles enlarges, becomes confluent, and a velvety papillary hypertrophy of the upper border of the tarsus develops. The same process occurs in the lower cul-de-sac, although less marked. Later the granulations advance in all directions, toward the tarsus and toward the bulbar conjunctiva, here often forming a red, thickened, granular ring around the globe. It is not unusual to see collections of pale, translucent follicles at the limbus. A later phase involves cicatricial changes with penetration of the tarsus, making healing difficult or impossible. Earlier stages yield well to therapy.

Treatment of incipient cases is begun with a therapeutic test, using zinc sulphate for two weeks. If the follicles remain stationary, as happens in the majority of cases, massage with sterile gauze is used, followed in several days by light cauterizations with the copper sulphate stick. After some time the conjunctiva becomes pale and smooth and shows fine cicatrices, but retaining its normal suppleness. The author believes the cicatricial changes to be a direct result of the sclerogenic properties of trachomatous tissues, as similar

treatment of the nontrachomatous conjunctiva produces no scarring.

Phillips Thygeson.

Reimann, H. A., and Pillat, Arnold. **Studies on the etiology of trachoma.** Jour. Exper. Med., 1931, v. 53, May, p. 687.

A bacillus which corresponds closely with the description of B. granulosis Noguchi was isolated from typical cases of trachoma in Chinese. Inoculation of suspensions of this bacillus into the eyelids of M. sinensis monkeys produced scarring and contraction of the tarsal cartilages with the development of a few conjunctival follicles in two out of five animals. The lesions did not resemble trachoma as seen in man. The swelling and hyperemia of the conjunctiva seen in the first few weeks after the inoculation were no more than to be expected following the traumatism by the needle or the introduction of the bacteria. The reaction diminished but did not disappear entirely. The number of superficial follicles did not increase. There was no velvety unevenness or papillary hypertrophy. There was also no obliteration of the meibomian glands or of the blood vessels of the conjunctiva such as is commonly observed in human trachoma.

M. E. Marcove.

Sédan, Jean. **Researches on the intradermal reaction of trachoma.** Rev. Internat. du Trachôme, 1931, v. 8, July, p. 153.

Sédan, using antigens prepared according to the method of Tricoire from three different cases of trachoma, performed intradermal tests on sixteen cases of trachoma, three normals, and six patients having other, nontrachomatous, eye disorders. Of the trachoma cases positive results were obtained in ten, doubtful in four, and negative in two. The reaction was sharp in florid trachoma, particularly in recent cases having a minimum of treatment, and was feeble when the disease was cicatrized. The four antigens used gave comparable results. The reaction was positive in two cases of tuberculosis and in three of syphilis. Three normal controls were negative.

Phillips Thygeson.

Szymanski. **Classification of trachoma.** Rev. Internat. du Trachôme, 1931, v. 8, July, pp. 117-120.

Szymanski, not satisfied with present classifications of trachoma, offers the following:

I. Incipient stage

A. Humid form: 1, acute mixed trachoma.

B. Dry form: 2, latent circumscribed trachoma.

II. Evolved (florid) stage

A. Humid form: 3, Granular generalized disseminated trachoma; 4, soft bulbar trachoma; 5, diffuse papillary trachoma.

B. Dry form: 6, gelatinous trachoma; 7, indurated trachoma (tarsitis); 8, trachomatous hemiptosis.

C. Complicated form: 9, trachoma with pannus; 10, trachoma with corneal ulcer; 11, trachoma with trichiasis and distichiasis.

III. Terminal degenerative stage

B. Dry form: 12, cicatricial trachoma; 13, xerotic trachoma.

C. Complicated form: 14, trachoma with entropion; 15, trachoma with eversion of the lower lid and stenosis of the lacrimal punctum; 16, trachoma with symblepharon; 17, trachoma with ankyloblepharon; 18, trachoma with leucoma; 19, trachoma with staphyloma; 20, binocular trachomatous amaurosis.

Phillips Thygeson.

Terson, A. **Advantages and indications for one percent silver nitrate ointment.** Ann. d'Ocul., 1931, v. 168, July, pp. 540-542.

The author has found the ointment especially useful in eczemas of the lid. In the Credé method of treatment of the new-born a standard strength of solution should be used.

H. Rommel Hildreth.

Tricoire, R. **The intradermal reaction of trachoma.** Rev. Internat. du Trachôme, 1931, v. 8, July, p. 144.

Tricoire reviews the literature on his intradermal reaction for the diagnosis of trachoma, and concludes that its diagnostic value appears certain. The antigen is prepared from trachomatous material obtained by expression of follicles from untreated cases. The material is triturated, and is left to macerate in the oven at 37° C. for two weeks. The mixture is then centrifuged in sterile tubes and the supernatant fluid drawn off and diluted with one volume of physiologic salt solution. Tincture of iodine, two drops per 10 c.c., is added as a preservative.

The intradermal dose is 0.25 c.c. A positive reaction appears in forty-eight hours after inoculation, as a painless red papule persisting two or three days. The reaction has been reported as positive in about sixty-eight percent of trachomatous individuals.

Phillips Thygeson.

Wilson, R. P. **A discussion on the etiology of trachoma with special reference to bacterium granulosis (Noguchi).** Brit. Jour. Ophth., 1931, v. 15, Aug., p. 433.

While there has been some doubt as to the infectivity of trachoma, evidence seems to establish the fact that it is communicable, the real question being, whether it is due to a single specific infection. This can only be determined by isolating from all cases a specific organism which when inoculated into the human conjunctiva will produce the disease. Investigation indicates that the virus is not filterable: the residue has produced positive results. Investigations of cell-inclusions have been disappointing.

The author and his coworkers have been only partially successful in isolating bacterium granulosis (Noguchi). The results of cultivation were entirely negative. After trying several different strains they utterly failed to induce positive granular lesions in thirteen monkeys. Transmission experiments with infected monkey tissue to another monkey showed a positive result with marked follicle formation and thickening of the conjunctiva. After inoculating monkeys with human trachomatous material both animals developed lesions only in the inoculated eye, but the appearance was typical of a case of spontaneous folliculosis. Monkeys being susceptible to folliculosis, animal experimentation is of limited value. Inoculation of human volunteers with B. granulosis or the tissue transfer of monkey tissue was entirely negative.

The author sums up his investigation with the question: "What is the relationship of B. granulosis to human trachoma?" He believes the problem will never be answered except as a result of human experiments. (Bibliography.) *D. F. Harbridge.*

6. CORNEA AND SCLERA

Bauer, August. **On the genesis of the Krukenberg spindle.** Zeit. f. Augenh., 1931, v. 73, March, p. 360.

The author attempts to explain the genesis of the Krukenberg spindle with the aid of two case reports. Considering all cases so far reported he finds that the Krukenberg spindle is usually associated with myopia, occurs chiefly in older subjects, and is most prevalent in the female. It is an independent disease, sharply demarcated from similar pigmentations of the posterior corneal surface. The pigment is of endogenous origin and comes from the pigmented structures of the eye. Destructive processes in the pigment cells, of slow chronic course, permit the degeneration products to reach the circulating fluid within the eye. This circulated fluid appears in the Ehrlich-Türk line, and deposits bits of pigment against the posterior corneal surface in the form of a spindle, whose greatest thickness lies opposite the pupillary margin. This area is favored for pigment deposition because of the slowing of the stream at the descending pathway of the convection current; and the deposition of pigment at the Ehrlich-Türk line may be attributed to changes in the

endothelial cells of the cornea, which give rise to the endothelial bedewing seen with the slit-lamp. The Krukenberg spindle is not a congenital but an acquired change. *F. H. Haessler.*

Berg, Fredrik. **Scleritis consecutive to parotitis.** Arch. d'Opht., 1931, v. 48, July, p. 508.

The writer calls attention to a previous report by himself upon this condition, and seconds Colrat's assumption that this type of scleritis should be considered a true complication of parotitis. *M. F. Weymann.*

Courtin, W. **Tuberculosis of the cornea as sequela of primary tuberculous focus on skin of face.** Arch. f. Kinderheilkunde, 1931, v. 93, May 15, p. 188.

Courtin reports the clinical history of a nursling aged eight months. At the age of four months a primary tuberculosis of the skin had been observed below the right angle of the mouth. The tuberculous nature of the skin lesion was demonstrated by microscopic examination and by skin tests. It is also pointed out that the mother, who tended the infant during the first few weeks of life, had an open tuberculosis, and it is probable that the infant was infected during this time. From the primary focus in the region of the mouth the tuberculosis spread to the cornea as a hand-borne infection, and there caused tuberculous ulceration. In the further course hematogenous dissemination took place. This was followed by tuberculous meningitis that ended fatally. (Jour. Amer. Med. Assoc.)

George H. Stine.

Granstrom, K. O., and Larsson, S. **An unusual case of keratoconjunctivitis with Parinaud's syndrome, transmissible to rabbits.** Acta Ophth., 1931, v. 9, p. 94. (See Section 5, Conjunctiva.)

Lindberg, J. G. **Two cases of so-called corneal dimple** (Dellen). Acta Ophth., 1931, v. 9, p. 88.

These dimples, originally described by E. Fuchs, are usually situated at or close to the limbus, and are 2.5 to 3.5 mm. in diameter and 0.5 to 1 mm. deep. They cause no symptoms and disappear after several hours. They were seen in acute or chronic inflammation of the tissues adjacent to the limbus (in episcleritis, scleritis, hemorrhages, after tenotomies, and so on), after cocain instillation, after cataract extraction, in one case of hemeralopia, in lagophthalmos paralyticus, and in older persons without obvious etiology. One case examined histologically by Fuchs showed that the depression was due to shrinking of the epithelium and of the outer layers of the corneal stroma; Fuchs considered them of troponeurotic origin. The first patient seen by the present author was a man forty years of age who was struck in the face with a stick. He had ecchymosis of the lids, and a corneal dimple 3 to 4 mm. in size and 0.5 to 1 mm. deep temporally at the limbus. The epithelium of this depressed area was rough and took the fluorescein stain; and the corneal parenchyma and the adjacent conjunctiva were swollen. With focal illumination this dimple cast a shadow on the iris, giving the impression of an iridodialysis. The eye was otherwise normal. The second patient, an army officer, forty years of age, had no history of traumatism, except for the possibility of being injured during sleep by the corner of a table placed near his bed. He presented himself with a small conjunctival hemorrhage in the left eye. He had a corneal dimple 4 mm. in diameter, extending over the temporal limbus. It disappeared within twenty-four hours.

Ray K. Daily.

Pacalin, G. **Treatment of hypopyon ulcer of the cornea with galvanic paracentesis.** Arch. d'Opht., 1931, v. 48, July, p. 498.

In cases of hypopyon ulcer of either trachomatous or nontrachomatous origin paracentesis with a fine-pointed galvanocautery is done to secure healing. If the ulcer is not central the puncture is made through its upper margin,

while if the ulcer is central a puncture is made near the limbus in the twelve o'clock position. Better results are obtained when the puncture does not enter the hypopyon, but allows the aqueous to escape with a spurt. Four case reports are given in detail.

M. F. Weymann.

Pillat, Arnold. **Bacteriological findings in prexerosis corneæ.** Graefe's Arch., 1930, v. 125, p. 173.

The bacteria occurring upon the cornea in prexerosis corneæ due to lack of vitamin A are, according to their frequency, the following: xerosis bacilli, pneumococci, staphylococci, diplobacilli and Koch-Weeks bacilli. The two first named microorganisms may occur exclusively or they may be associated with other bacteria, although in this case they usually predominate. All the germs mentioned should be considered as saprophytes or parasites which find their best culture medium among degenerated epithelial cells. In some countries, such as in China, where there are present many conjunctival inflammations due to the Koch-Weeks bacillus, this organism is classified with the four other conjunctival saprophytes. The organisms mentioned are found not only on the cornea but also in quantities upon the bulbar and palpebral conjunctiva, where they occur in no other disease. Since unlimited growth of the bacteria follows degeneration of epithelial cells upon the bulbar and palpebral conjunctiva, it is possible to diagnose a prexerosis of the conjunctiva by positive bacteriological findings in the absence of all other signs of deficiency disease such as Bitot's spot, folding of the bulbar conjunctiva, and night-blindness, although the last is rarely absent in cases with positive bacteriological findings. In mixed cases of prexerosis and eczematous keratoconjunctivitis there are as a rule fewer saprophytes than in uncomplicated cases of deficiency disease. To a certain extent a true inflammation counteracts the unlimited development of the conjunctival parasites.

H. D. Lamb.

Puscariu, E. **Frequency of trachomatous pannus up to the age of twenty years and its relation to the age of the disease.** Rev. Internat. du Trachôme, 1931, v. 8, July, p. 166.

Puscariu examined 101 trachomatous individuals varying in age from four to twenty years. Of these sixty-five were school children and they included only three cases of pannus. In the other thirty-six there were nineteen cases of pannus. The author believes that the inspections and obligatory treatment which are in force in the schools account for the low incidence of corneal complications among the pupils.

Phillips Thygeson.

Sédan, Jean. **Interstitial keratitis and trachoma.** Rev. Internat. du Trachôme, 1931, v. 8, July, p. 168.

Sédan reports two cases in which both syphilitic interstitial keratitis and trachoma were present and in which antisyphilitic arsenic therapy produced a decided amelioration of the trachoma. He adds that a series of syphilitics having trachoma but not interstitial keratitis showed no benefit from arsenical treatment. *Phillips Thygeson.*

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Daniels, B. **Sympathetic ophthalmia after choroidal sarcoma.** Zeit. f. Augenh., 1931, v. 74, May, p. 146.

The author describes a case of sympathetic ophthalmia without perforating injury in an eye in which a choroidal sarcoma had become necrotic. After histological examination of twenty-two other eyes afflicted with sarcoma he finds that this does not differ from the sarcoma which was associated with sympathetic ophthalmia except for the massive necrosis which occurred. This, it seems to the author, supports Elschnig's hypothesis as to the genesis of sympathetic ophthalmia.

F. H. Haessler.

Rousseau, F. **Hypertony in acute iridocyclitis; indications for surgical treatment.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 603-619.

Four cases of iridocyclitis are reported in detail. Glaucoma appeared at different stages and was relieved by surgery. The best results are obtained by a subconjunctival drainage operation. In syphilis medical care alone is sufficient. *H. Rommel Hildreth.*

8. GLAUCOMA AND OCULAR TENSION

Duke-Elder, W. S. **The metabolism of the eye: 1, physiologic aspects.** Arch. of Ophth., 1931, v. 6, July, pp. 1-20.

Molecules, atoms and ions, and their semi-isolation by numerous membranes constitute the subjects of this study. There is only one intraocular fluid. Its constituents may be divided into three groups: (1) large molecules, the colloids, such as proteins, present in traces; (2) small molecules of non-ionizable solutions, such as sugar; and (3) small molecules of ionizable salts, in considerable concentration of the plus cations, such as sodium, and minus anions, such as chloride, present in much smaller concentration. All interchange between the blood and tissues must take place through the capillary wall. The negative protein molecules are held back, and with them some of the positive sodium ions, and at the same time the diffusible ions must retain an equilibrium such that the products of their concentrations will remain equal on both sides of the membrane, while the sugar molecules pass back and forth freely and are termed a dialyzate.

The physical equilibrium must fulfill the same requirements; in other words, the hydrostatic pressure in the capillaries must be equal to the sum of the intraocular pressure and the difference in osmotic pressure between the two fluids. By experimentation, the author found that the osmotic pressure of the intraocular fluid was exactly that of a dialyzate of blood serum and less than that of plasma by 30 mm. Hg. The blood pressure in the eye was determined for the retinal artery and the intraocular veins, and was estimated for the capillary veins. The results of these studies showed the requirements of the physical equilibrium to be exactly obeyed. It was further found that in abnormal conditions, changes took place in terms of the same equilibrium. Such an equilibrium is essentially dynamic, not static, and the aqueous humor is, therefore, not stagnant, but in constant motion. Ordinarily, the pressure in the exit veins is greater than the intraocular pressure, but if the latter is raised it becomes greater than the exit pressure.

The aqueous cannot be a secretion, since a secretion is of necessity elaborated from a parent substance by energy, chemical, hydrostatic, osmotic or electrostatic, and precludes a thermodynamic equilibrium. It cannot be a transudate, as it contains an excess of chlorides. It must be, therefore, a dialyzate, or there must be a gland in the eye secreting chlorides.

The vitreous has been shown elsewhere to be a simple and homogeneous gel with no structure. It is elastic and turgescible, swelling if the hydrogen ion concentration is decreased and vice versa, and breaking down, if its metabolism is upset, into a fluid-containing protein residue in the form of coagula seen as fibers, strands, and membranes. Here also there exists a thermodynamic equilibrium.

The disruption of the third equilibrium, between the intraocular fluid and the lens, is one of the factors resulting in the formation of cataract.

The fourth equilibrium is the result of dialyzation from the retinal vessels. An upset of one kind results in scotomata, of another in detachment of the retina.

(See also below, part 2.)

M. H. Post.

Duke-Elder, W. S. **The metabolism of the eye. 2, clinical applications.** Arch. of Ophth., 1931, v. 6, Aug., pp. 158-179.

(See also above, part 1.)

Glaucoma is the first clinical problem dealt with. The underlying causes

for changes in intraocular pressure may be divided into three categories: (1) external pressure on the globe, the result of the action of the extraocular muscles; (2) an alteration of the equilibrium between the blood pressure in the capillaries and the difference between osmotic pressure of the plasma and of the intraocular fluid; (3) a change in volume of the contents of the globe. This must be brought about by a change in the coats of the eye, or in volume of the aqueous humor, the lens, and the vitreous body. With regard to turgescence and deturgescence of the vitreous body, it should be remembered that proteins in the gel may act as acids or bases. At the neutral or iso-electric point, swelling is at a minimum. This point was found by the author to be in the region of pH 4 or 5, and from here the vitreous swells on the introduction of alkalies and shrinks in acids. This swelling of the vitreous is not likely to be the result of varying reactions of the blood, but it is more likely that the metabolic activity of the vitreous, at present little understood, is disturbed in such a way as to alter the interrelation between the various proteins of the vitreous, resulting in swelling and shrinking.

Retinal detachments are considered from the point of view of this study, along the lines of the author's monograph entitled "The nature of the vitreous body" (see American Journal of Ophthalmology, 1931, volume 14, page 163.) *M. H. Post.*

Holth, S. **Histology of fistulas following anterior sclerectomy.** Arch. of Ophth., 1931, v. 6, Aug., pp. 151-157.

The author does not approve of anterior sclerectomy combined with iridencleisis, as the conjunctiva is quite thin at the limbus and secondary infections are prone to occur. He prefers an extralimbal subconjunctival keratome section opening from 2 to 3 mm. back of the limbus, combined with iridencleisis. In this procedure, the conjunctiva over the scleral incision is much thicker and at the same time the ciliary body is protected against secondary atrophy of the scleral beak.

M. H. Post.

Jahnke, Walter. **Histological findings in glaucoma with accompanying flame nevus of the face.** Zeit. f. Augenh., 1931, v. 74, May, p. 165.

A number of cases of flame nevus of the face accompanied by glaucoma have been reported in recent years with a view to establishing an etiological connection. A fourth case is here reported. It occurred in a man forty-three years old, with congenital nevus flammeus. The eye was blind from the eleventh year on, possibly since birth. The patient entered the clinic in a state of absolute glaucoma. Elschnig's method, compression of the common carotid artery and massage of the bulb on the same side, which shows the dependence of the intraocular pressure on the degree of fullness of the ocular vessels, gave no result. After Thiel's method of compressing the jugular vein the tension also remained unchanged. X-ray therapy was tried but had to be discontinued on account of pain. Enucleation was performed with undue loss of blood. X-ray picture of the skull showed a tortuous network of diploë veins which was presumably related to the nevus flammeus. A cause of the glaucoma was a flat hemangioma of the choroid. Secondary adhesions seen histologically in the chamber angle probably caused the increase in severity of the glaucoma. No congenital malformations were found in either the chamber angle or Schlemm's canal. (Long bibliography.) *F. H. Haessler.*

Larsson, S. **Further studies of consensual posttraumatic reduction of intraocular tension.** Acta Ophth., 1931, v. 9, p. 85. (See Section 16, Injuries.)

Morax, V. **Etiology and treatment of glaucoma secondary to extraction of the lens.** Bull. et Mém. Soc. Franç. d'Opht., 1930, p. 84.

Morax presents two cases of glaucoma following cataract extraction.

The first followed three days after an extraction which was normal except for some delayed union of the wound due to capsular débris. Miotics failed to help and anterior chamber punctures made on three occasions gave only temporary relief. No signs of iridocyclitis were seen. A sclerecto-iridectomy was then done, which resulted finally in restriction of tension to from 30 to 35 mm., and in cessation of all irritative and painful symptoms.

The second case was a simple extraction complicated by iris prolapse and iritis. The eye quieted satisfactorily, but four months later glaucoma developed, which was temporarily relieved by resection of the iris prolapse and iridectomy. Two months later the tension suddenly rose to 60 mm. Miotics failed to relieve and a sclerecto-iridectomy was performed, which controlled the tension for two months only. The eye had finally to be enucleated. Anatomic examination showed an ingrowth of epithelium which covered the posterior surface of the cornea and continued over on to the anterior surface of the iris.

Morax recommends sclerecto-iridectomy in these cases of secondary glaucoma as the most promising method of treatment. Where epithelial invasion has taken place, no matter what treatment is used failure is certain.

Phillips Thygeson.

Passow, A. **The hypotensive action of certain body substances upon the eye.** Arch. f. Augenh., 1931, v. 104, July, pp. 490-521.

In his work, Passow used fresh tissue from pigs or cows, and he determined the hypotensive action of cats' eyes. In the use of ocular tissue, the various layers were separated and pressed in the micropress. The fluid was then filtered. For other tissue, the tissues were merely expressed and filtered. The uveal press-fluid reduced the blood pressure of cats more than the retinal press-fluid, but did not influence intraocular tension. The retinal press-fluid, however, caused marked reduction of intraocular pressure and contraction of the pupil.

The press-fluids of brain and spinal cord have an action on cats' eyes similar and in equal potency to that of the retinal fluid.

The press-fluids of the thyroid, ovary, testicle, and spleen have decidedly weaker hypotensive action than the fluids of retina, brain, or spinal cord. Other organs, such as the mesentery, intestine, lung, or kidney, whose press-fluid reduces blood pressure, had no effect upon the eye. The effect was the same whether pig or beef tissue was used. The action of the various substances was the same on rabbits as on cats. The hypotensive action of the press-fluid of retina and brain could be counteracted by atropin. The active principle of the fluid derived from retina and brain was not heat-resisting and could not be dialyzed. The action of this fluid was not due to the substance being foreign to the species, as the tissue of the same species produced the same effect.

The greatest possibility for the treatment of primary glaucoma with organotherapy seems to be, from Passow's work, in the use of the nerve organs, that is, brain, spinal cord, and retina.

Frederick C. Cordes.

Rosengren, B. **A study of the depth of the anterior chamber, with particular reference to primary glaucoma.** Acta Ophth., 1931, v. 9, p. 103.

This study was undertaken to determine whether the depth of the anterior chamber in glaucoma was abnormal, and whether the shallow anterior chamber followed or preceded the increased tension. After a review of former studies in this field, the author reports his conclusions based on measurements made with Lindstet's apparatus on 810 normal eyes, and 4 cases of juvenile, 55 cases of bilateral, and 51 cases of unilateral glaucoma. He concludes that the depth of the normal anterior chamber shows wide individual variations, and diminishes with age; the average depth at twenty-five years

being 3.6 mm. and at seventy years 3.15 mm. There is practically no difference in the depth of the anterior chambers of the same individual. The average depth of the anterior chambers of 100 glaucomatous eyes was shallower than normal. This diminution in the depth of the anterior chamber was, however, pronounced only in acute inflammatory glaucoma; in the other types the depth of the anterior chamber was practically normal. The diminution in the depth of the anterior chamber could be demonstrated prior to and independently of the glaucomatous attack; the rise in intraocular tension having no effect on the depth of the anterior chamber. A shallow anterior chamber is a predisposing factor in the etiology of glaucoma. *Ray K. Daily.*

Terson, A. **Posterior thermopuncture in absolute glaucoma following retinal detachment.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 596-603.

The eye was painful, did not respond to medical treatment, and had no anterior chamber, so that an anterior drainage operation was impossible. Posterior thermopuncture resulted in a comfortable, quiet eye.

H. Rommel Hildreth.

Vail, D. T. **Adult hereditary anterior megalophthalmos sine glaucoma: a definite disease entity, with special reference to the extraction of cataract.** Arch. of Ophth., 1931, v. 6, July, pp. 39-61.

Eight cases of anterior megalophthalmos are reported which were operated on for cataract by the author's father or by himself. The literature shows that eighteen cataracts have been removed from such patients. In twelve the operation was successful. In eleven the lens was delivered on the spoon or needle, in seven there was loss of vitreous. In three cases there was glaucoma before the operation. Two had postoperative iritis, from which one recovered. There was retinal detachment in three cases. Following the initial incision, there is, as a rule, escape of a large amount of aqueous, for which reason it seems best to make a small incision with the Graefe knife, later enlarging it with scissors. Extraction in capsule or removal of the anterior capsule with forceps is recommended. *M. H. Post.*

Velhagen, K., junior. **Concerning the presence of a depressor substance in the eye.** Arch. f. Augenh., 1931, v. 104, July, pp. 546-574.

From his experimental work, Velhagen concludes that histamin is present in the eyes of cattle. Under physiological conditions, however, the quantity is very small.

Frederick C. Cordes.

Weekers, L. **General laws of experimental ophthalmotonic reactions, direct and consensual, provoked by different procedures.** Arch. d'Opht., 1931, v. 48, Sept., p. 593.

It is pointed out that experimental procedures such as massage, compression of the globe, irritation of the iris and ciliary body, subconjunctival injections, and burns of the sclerotic, which produce an irritation of the eye leading to congestion of the uvea are usually followed by a brief period of hypertension and a more prolonged period of hypotension. The vasodilatation produced will explain the immediate abrupt rise in tension, but the succeeding hypotony must be explained upon a basis of increased filtration of aqueous, because sections of an eye which have received a scleral burn show vasodilatation persisting even during the period of hypotony. Fluorescein tests upon such eyes also show quicker appearance of the color during the periods of both hypertony and hypotony than normal. The unburned eye of the opposite side also participates to a lesser degree in the tonus changes.

The writer is of opinion that procedures which produce changes in tonus act by changing the rate of entrance and exit of aqueous from the eye. The mechanism may be vascular, but it is the volume of aqueous which directly

affects the tonus in a change of any duration, and not the quantity of blood in the uvea.

Surgical procedures which relieve glaucoma produce their effect through either diminishing the inflow or increase in the outflow of aqueous. In glaucoma the outflow is best increased by producing a modification of the uveal circulation with an iris inclusion operation. This produces the desired result with the least possible mutilation.

M. F. Weymann.

Wood, D. J. **The resistance of the lamina cribrosa in glaucoma.** Jour. Med. Assoc. of South. Africa, 1931, v. 5, April, p. 251.

In the first case there was four diopters of cupping with a Bjerrum scotoma, but the tension was never above 16 mm. of mercury. Excavations of the optic nerve and resulting scotomata may be found where the tension is even subnormal, if the lamina cribrosa is deficient in resisting power.

Three other cases are described in which the cupping had entirely disappeared, when the patient was examined several years after operation.

M. E. Marcove.

9. CRYSTALLINE LENS

Badot, J. **Occupational cataract in glass workers.** Bull. et Mém. Soc. Franç. d'Opht., 1930, p. 33.

Badot discusses briefly occupational cataract and reports eight representative cases occurring in glass workers. According to the ages at operation of a series of over two hundred cases, he found five percent occurring below the age of 40 years, forty-two percent from 40 to 60 years, and fifty-three percent from 60 to 80 years. This agrees with statistics given by other authors (Wick, Rohlinger).

In a general way three stages in the evolution of this cataract can be described. The first leads to opacity of the posterior lens capsule involving exactly the site of axial projection of the pupil, the remainder of the lens being protected by the iris. The second stage leads to opacity of the subcapsular lens fibers, the nucleus remaining unaffected. The third stage leads to opacity of the anterior and peripheral zones until finally the entire lens is opaque. This type of cataract may be very slow in evolution and may often be unilateral.

The pathogenesis of this disease has been variously ascribed to the action of the intense heat and light, to the excessive sweating, and to the ultraviolet and infrared radiations. With the increased use of mechanical aids in the glass industry, it is probable that in a few years this type of occupational cataract will be only a memory.

Phillips Thygeson.

Birch-Hirschfeld. **A comparison of results of cataract operation with or without conjunctival flap.** Zeit. f. Augenh., 1931, April, v. 74, p. 1.

During the past eight years Birch-Hirschfeld has used almost exclusively for extraction of cataract a procedure in which Kuhnt's conjunctival flap plays an important part. After subconjunctival injection of novocain and adrenalin above, the author separates the conjunctiva from the limbus and dissects the flap from the sclera. Sutures are then placed nasal and temporal to the cornea in such a way that the flap will override the cornea when they are tied. This procedure does not increase the difficulty of making the corneal incision. The author prefers basal iridectomy, opens the capsule, and uses Daviel's spoon to remove lens débris. Perfect vision and absence of astigmatism were obtained in a much larger number of patients with the new method, and the number of after cataracts was smaller. Loss of vitreous occurred only one-half as often and bursting of the wound with or without iris prolapse only one-fourth as often.

F. H. Haessler.

Borges de Sousa, A. **A new method in ocular surgery employing ultraviolet light.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 644-653.

To bring into view a dislocated lens, the author takes advantage of the prin-

ciple of fluorescence, as shown by the crystalline lens in the presence of ultraviolet light. The method is helpful in operating for such a condition; and by the same means lens cortex is made visible in the anterior chamber following extracapsular extraction.

H. Rommel Hildreth.

Bulac, C. O. **The morphology of the neuroglia of the optic nerve and retina according to the methods of the Spanish school (Ramon y Cajal).** Zeit. f. Augenh., 1931, v. 74, June, p. 248. (See Section 10, Retina and vitreous.)

Hartmann, E. **Biomicroscopic appearance of a zonular cataract.** Bull. et Mém. Soc. Franç. d'Opht., 1930, p. 8.

Hartmann reports the case of a railroad employee aged thirty-nine years who presented in the right eye the following condition: On the surface of the adult nucleus could be seen a triangular opacity with base external, which was united behind the iris with an almost identical opacity on the posterior face of the nucleus. The remaining surface was covered with many fine opacities, the most peripheral of which appeared to have a radial arrangement. The interior of the nucleus appeared absolutely normal.

There was also a rounded opacity of the anterior capsule which was united to the zonular opacity by a fine opaque strand. Finally, stretching from the capsular cataract to the cornea was a long white cord. The corneal insertion, situated directly in front of the capsular opacity, presented a series of white and brown spots, which occupied the entire thickness of the cornea up to the epithelium. Vision in the eye was two-thirds. No other anomaly of the eye could be discovered after careful search.

Hartmann considers the capsular cataract of almost certain congenital origin. The cord uniting this opacity with the cornea may be the result of a simple developmental anomaly or possibly the remains of an intrauterine infection with perforation of the cornea. The zonular cataract would probably have to be considered as acquired.

Phillips Thygeson.

Manes, A. J. **Surgical treatment of myopia.** Arch. de Oftal. de Buenos Aires, 1931, v. 6, Jan.-Feb., p. 23. (See Section 3, Physiologic optics, refraction, and color vision.)

Marquez, M. **Two minor accidents in cataract extraction and means to avoid them.** Arch. de Oft. Hisp.-Amer., 1931., v. 31, March, p. 132.

(1) Rising of the iris in front of edge of knife, from premature evacuation of aqueous. The following alternative to making a forced, painful and irregular iridectomy has been practiced successfully: The counterpuncture is slightly extended with the knife, the knife is withdrawn and the puncture wound extended in passing, a spatula is introduced through puncture and counterpuncture, and on it as a guide the knife is reintroduced and section finished with spatula and knife together as if they were a single instrument. In order to make the two blades of the two instruments touch and remain parallel throughout when superposed, the author has had Moria-Dugast construct a special spatula in the form of a bayonet.

(2) Failure to deliver the lens because its upper edge is above the level of the incision. The author reintroduces the cystotome and displaces the lens downwards en masse.

M. Davidson.

Nordmann, Jean. **Sensitivity of the crystalline lens to x-rays.** Arch. d'Opht. 1931, v. 48, Aug., p. 560.

From a review of the literature on this subject, one is drawn to believe that the lens may be easily damaged by exposure to x-rays, either directly or indirectly. Even repeated small dosages may cause a later formation of cataract. An eight-year-old child had received one application of x-rays at the age of five years for ringworm. In spite of the fact that the eyes were protected, opacities developed at the posterior

pole of each lens three years after exposure.

While in most cases x-rays about the eyes may do no harm, in hypersusceptible individuals cataract may follow. It is concluded that the lens is the most sensitive part of the eye to x-rays.

M. F. Weymann.

Roure. **The placing of corneal incisions as recently proposed for cataract operation.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 641-644.

In 1918 the author proposed the systematic use of inferior keratotomy. Six years later he published the results of the first two hundred operations. In this later work on the same subject he still favors the section below for senile cataract but chooses a vertical incision for traumatic cataract and foreign bodies. His technique for the vertical incision is detailed.

H. Rommel Hildreth.

Sédan, Jean. **Bilateral cataract following thyroidectomy in a case of exophthalmic goiter.** Ann. d'Ocul., 1931, v. 168, July, pp. 571-573.

A subtotal thyroidectomy was performed on a forty-three-year-old pregnant woman. Postoperative tetany occurred. Three months later bilateral cataracts developed. Normal delivery of a dead fetus occurred six months after the operation. An intracapsular cataract extraction was performed without complications fourteen months after the thyroidectomy. The corrected vision was 9/10.

H. Rommel Hildreth.

10. RETINA AND VITREOUS

Bailliart, P. **Some considerations on the pressure in the central retinal vein.** Ann d'Ocul., 1931, v. 168, July, pp. 513-539.

Certain aspects of the physiology of the circulation of the central retinal vein are discussed in considerable detail. Particularly the venous pressure is considered in relation to the retinal arterial pressure and the intracranial and peripheral venous pressure in normal and pathological states. The article does not lend itself well to abstracting.

H. Rommel Hildreth.

Bettremieux. **The curability of retinal detachment.** Ann d'Ocul., 1931, v. 168, Aug., pp. 632-635.

This brief discussion points out the tolerance of the eye for cauterization, and concludes that the chance for cure of retinal detachment is greater with the newer methods of surgery.

H. Rommel Hildreth.

Lagrange, E. **A case of pseudodetachment of the retina.** Arch. de Oft. Hisp.-Amer., 1931, v. 31, March, p. 129.

A young man of twenty-one years with ill defined symptoms of metamorphopsia but with vision of 20/20 in his left eye, and a bilateral hypotony (O.D. —12, O.S.—11), exhibited in the extreme periphery at the five o'clock position a pigmented somewhat elevated retina. There was an indentation of the field corresponding to the lesion when taken with a dull white stimulus, but a normal field to a 1.5 mm. luminous stimulus. Blood pressure was 110/65; the Wassermann negative. Intensive antiluetic treatment and rest in bed were instituted under a tentative diagnosis of retinal detachment and lues. But the lesion continued to progress, reached the macula in two weeks, and after consultation a diagnosis of detachment by disinsertion was arrived at and a Gonin operation seriously considered. The patient, however, in view of the 20/20 vision, refused. The condition has remained stationary during an observation of six months, but further studies of the fundus enabled the author to trace the retinal vessels across the presumed tear at the ora serrata, and, in view of the intactness of the field to a luminous stimulus, led him to reject the diagnosis of detachment. He believes that he is dealing with a retinitis proliferans, the sequel of a spontaneous vitreous hemorrhage, in support of which are the low blood pressure and the cervical lymphadenitis. While he does not insist on the suggested diagnosis, he feels he has ruled

out the diagnosis of detachment, and he suggests the use of a luminous stimulus in the exploration of visual fields. (Fundus pictures.) *M. Davidson.*

Lijo Pavia, J. **Alterations in the retinal reflexes.** Arch. d'Opht. 1931, v. 48, Aug., p. 566.

Two cases are reported in detail with fundus photographs to demonstrate that choroidal lesions in or near the macula may manifest themselves in their early stages by alterations in the retinal reflex. At present this reflex is best studied by means of the Nordenson camera. *M. F. Weymann.*

Lijo Pavia, J. **The use of photography in retinal detachments behind the equator.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 635-640.

Photographs of the retina are taken at different angles, and from them, a panoramic picture is composed. Localization of retinal tears is computed in relation to the disc.

H. Rommel Hildreth.

Mann, Ida. **Treatment of detachment of the retina.** Med. Women's Jour., 1931, v. 38, April, p. 91.

This paper deals with the etiology, pathology, and treatment of detachment of the retina. Both the nonoperative and the operative measures of treatment are considered. Stress is placed upon the Gonin operation.

M. E. Marcove.

Terson, A. **Posterior thermopuncture in absolute glaucoma following retinal detachment.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 596-603. (See Section 8, Glaucoma and ocular tension.)

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Alpers, B. J., and Comroe, B. I. **Syringomyelia with choked disc.** Jour. Nerv. and Ment. Dis., 1931, v. 73, June, p. 557.

The literature is reviewed. Choked discs occurred in a case of syringomyelia, 5.00 D. in the right eye and 4.50 D. in the left, with engorged retinal veins and a few small hemorrhages. The vision was 6/12 in the right and 6/9 in the left. X-ray examination indicated the presence of an extrasellar tumor. No tumor was found at operation. At postmortem examination a large cavity in the spinal cord and an internal hydrocephalus were found.

According to the authors, the causes of choked disc in syringomyelia may be either hydrocephalus or tumor. In this case the internal hydrocephalus caused an increase in intraocular pressure. In all the cases cited, the syringomyelial signs have been overshadowed by those of increased intracranial pressure.

M. E. Marcove.

Fried, J. **Treatment of tabetic optic atrophies with sulphur.** Jour. Nerv. and Ment. Dis., 1931, v. 73, May, p. 487.

This is a very enthusiastic paper giving the results in the treatment of optic atrophy by alternate intramuscular injections of 1 c.c. of bismuth salicylate and 1 c.c. of bismuth salicylate with 0.2 c.c. sulphur. Injections were given every third or fourth day and produced a high fever, up to 105 degrees. Twelve cases are reported. The visual acuity, the visual fields, and the ophthalmoscopic pictures are described. Six showed marked improvement, four some improvement, one remained unchanged, and one became worse. These cases were observed for from six to forty-four months. The vision in the best case was 20/48 and the rest of the cases were below 22/100. The fields in all except one of these cases were markedly contracted. The general clinical diagnosis in eleven cases was locomotor ataxia and in the other taboparesis. *M. E. Marcove.*

Vail, H. H. **Retrobulbar optic neuritis originating in the nasal sinuses.** Arch. of Otolaryng., 1931, v. 13, June, p. 846.

After a brief review of the literature the author cites fifteen cases of retrobulbar optic neuritis of nasal origin. Statistics are quoted to show that the

ocular symptoms constitute an early indication of multiple sclerosis in only fourteen percent of the cases. The opinion is stressed that the virus of multiple sclerosis may gain entrance to the central nervous system from the sphenoid sinus. When the onset of blindness was acute and could be definitely stated, it was always noticed after awakening from sleep. The position of the head in sleeping favors gravitation of infection to the upper outer angle of the sphenoid sinus, where the optic nerve is in closest relationship.

A new method is described for x-ray visualization of the relation between the optic canal and the sphenoid sinus, by filling the sinus with radioopaque oil and so placing the patient's head that the upper outer angle of the sinus is dependent. This causes the oil to come into contact with the boundary of the sphenoid sinus where it is most closely related to the optic nerve.

M. E. Marcove.

12. VISUAL TRACTS AND CENTERS

Martel, T. de., Monbrun, and Guillaume, J. **The ophthalmologic outlook of those operated for tumor in the hypophysial region.** Arch. d'Opht. 1931, v. 48, Aug., p. 529.

Five cases are reported to show that, after successful surgical intervention where the fields and visual acuity were considerably affected in cases of tumor in the region of the hypophysis, marked improvement in vision and fields may occur. This improvement took place in spite of the fact that the papillæ showed a marked pallor. This pallor was not considered as a sign of optic atrophy, but as a sign of diminished circulation, due to the ischemia produced by pressure of the growth on vessels which supply the optic nerve. Surgical treatment of these tumors is preferable and more successful than x-ray.

M. F. Weymann.

13. EYEBALL AND ORBIT

Imai, Nobukatsu. **Experimental observations on ossification in the eye.** Graefe's Arch., 1930, v. 125, p. 267.

The author observed the intraocular formation of bone in twelve rabbits out of twenty-six following injection into the vitreous of 0.25 to 0.3 c.c. of ten percent formic acid. The eyeballs were enucleated at intervals varying between 25 and 195 days after injection of the formic acid. The intense reaction in the eyeball that immediately followed the injection had completely subsided by the end of the fifth week, when the eye began also to shrink. In the positive cases the process of ossification, with few exceptions, occurred without deposit of lime in the prechoroidal proliferated connective tissue. It was found that bone could be observed microscopically in an eye removed only a month after the time of injection. The author thinks that impregnation of the osteoid tissue with lime is most likely due to the activity of bone cells derived from connective tissue cells. The microscopic appearance of the newformed bone tissue leads him to think of an indirect metaplasia without preceding deposit of lime.

H. D. Lamb.

Lemos, J. de. **Unexplained unilateral exophthalmos.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 665-669.

The exophthalmos had existed in a sixty-three-year-old laborer for a year and a half. It could not be reduced, the vision was diminished, the disc was slightly edematous, the external rectus was weakened, and x-ray showed destruction of the inner wall of the orbit. At operation no pathology could be found and the orbital walls were found to be intact. The condition did not change over a further period of about two years. *H. Rommel Hildreth.*

Nicloux, M., and Redslob, E. **Passage of alcohol into the vitreous and lens.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 593-596.

Chemical studies following ingestion of alcohol in the rabbit showed that in three hours the amount of alcohol in the vitreous equalled that in the blood; while the ratio in the lens was one-half.

H. Rommel Hildreth.

14. EYELIDS AND LACRIMAL APPARATUS

Cummer, C. L. **Dermatitis of the eyelids caused by dionin.** Arch. Derm. and Syph., 1931, v. 23, Jan., p. 68.

The author reports a case of dermatitis of the eyelids due to the regular instillation of dionin into the conjunctival sac. The drug had been used twice a day for eleven years in the treatment of incipient cataract, without causing dermatitis. During this time, the strength of the solution was raised from two to four percent. Suddenly there developed an intense dermatitis which improved when the drug was removed, and recurred when it was resumed. *M. E. Marcove.*

Gomez Marquez. **Some considerations of the several stages of dacryocystorhinostomy.** Arch. de Oft. Hisp.-Amer., 1931, v. 31, March, p. 147.

On the basis of 517 Dupuy-Dutemps-Bourguet operations performed by the author in the course of the last six years, the lessons learned and the procedure ultimately arrived at are described and illustrated in detail. The fundamental principle is that the lacrimal bone and the ascending process of the superior maxilla must be trephined, and that the nasal mucosa and the sac must be sutured. Conduction anesthesia is achieved by injecting the internal branch of the nasal nerve, and direct anesthesia of the nasal duct through the skin is resorted to. No nasal tampon is required. A retractor such as is used in mastoid work is recommended in place of the Mueller or Axenfeld speculum. The lids are sutured in certain cases. Through a puncture in the anterior wall the sac is explored with a sound as to size and as to existence of valves. Extirpation is practiced if the sac is small, sclerosed, or valvular. An 8 mm. dental trephine from which the pin has been removed is used. A special retractor to protect the sac is illustrated. The trephine is held inclined toward the eye. The trephine ostectomy is enlarged with the Citelli or Kocher forceps. An ample bone opening is aimed at, and the smaller the sac the larger the ostectomy necessary. The anterior wall puncture is extended to give access to the medial wall of sac, which is split, while protection is afforded to the common duct by the introduction of spatulæ. Care must be taken to resect and obliterate the diverticulum formed by the lower end of the sac, or else troublesome conjunctivitis and keratitis may follow from stagnation of secretion. The nasal mucosa is pushed up into the opening from the nose with the Kocher forceps, and sutured to the sac by Deschamps needles and silk, both anteriorly and posteriorly, the anterior lip being sutured before incision. If cases of tumor and tuberculosis, and of active ozena, and other unsuitable cases are eliminated, the operation gives ninety-eight percent of successes, as proved by permeability to colored solution instillations beyond one month. The patients' subjective complaints of continuing epiphera need not be accepted at their face value. Cosmetic results are sometimes marred by keloid, which yields to internal use of tincture of iodin. Slight lower lid ectropion and lagophthalmos disappear in a few weeks.

M. Davidson.

Marin Amat, Manuel. **A serious late complication of dacryocystorhinostomy.** Arch. d'Opht., 1931, v. 48, Sept., p. 632.

In two cases hemorrhage which was so severe as to be almost fatal occurred on the fifth day after dacryocystorhinostomy. The bleeding was arterial in nature, and in one case the wound had to be opened to reach the bleeding point. In both cases horizontal incision of the nasal flap was done, which cut branches of the anterior ethmoid arteries. Preliminary study of these patients might help to avoid such complications.

M. F. Weymann.

15. TUMORS

Cosmettatos, G. F. **Epithelial plaques of the cornea.** Ann. d'Ocul., 1931, v. 168, Aug., pp. 619-624.

These benign neoplasms are of three types; scaly, warty, and epithelial. A

case is reported and a photomicrograph shown. The epithelium is hyperplastic without papillæ or evidence of downgrowth, being thus distinguished from epithelioma. *H. Rommel Hildreth.*

Filatoff. **Is it necessary to remove tumors that have passed beyond the limits of the orbit?** Ann. d'Ocul., 1931, v. 168, July, pp. 574-586.

The results of twenty-one cases of malignant tumor of the orbit with invasion of the nasal sinuses are reported after radical surgical treatment. The number of cures and the prolongation of life make the author feel that such surgery is worth while. He describes two methods of operation, one proposed and previously published by himself and Lyssenkoff in 1921, spoken of as extraorbital orbitosinusal exenteration. Approach is made through the face and includes, as the name suggests, a wide excision of the bony orbit with surrounding nasal sinuses. The external soft parts are brought together, packing and drainage being done through the nose.

H. Rommel Hildreth.

Terrien, F., and Cousin, G. **Epithelioma at the limbus.** Arch. d'Opht., 1931, v. 48, Sept., p. 622.

Epithelioma at the limbus is usually a slowly growing tumor and tends to recur after removal. Until the orbit is invaded metastasis is rare. One case is reported in which recurrence twice followed cauterization, but in which apparent cure was finally achieved through diathermy coagulation. These patients should be kept under observation over a long period after apparent cure, as recurrences are common and if not discovered early they may lead to serious results. Removal by the electric knife with application of high frequency current to the base is recommended as the best means of cure.

M. F. Weymann.

NEWS ITEMS

The only contributor to this issue's news items was Dr. G. Oram Ring of Philadelphia. News items should reach **Dr. Melville Black, 424 Metropolitan building, Denver,** by the twelfth of the month.

Deaths

Dr. Joseph Brown Farrior, Tampa, Fla.; aged fifty years; died October third, of carcinoma of the stomach with metastasis.

Dr. Erastus Eugene Holt, Sr., Portland, Me.; aged eighty-two years; died October second, of lobar pneumonia and arteriosclerosis.

Dr. Calvin Ross Elwood, Menominee, Mich.; aged sixty-one; died September eighteenth, of coronary thrombosis and chronic myocarditis.

Dr. Charles W. Kollock, Charleston, S.C.; aged seventy-four years; died September twenty-third, of amyotrophic lateral sclerosis and chronic myocarditis.

Miscellaneous

The New York Association for the Blind was left $5,000 by the late Mrs. Anne K. Smith.

The eye swindlers are still at it. California and Western Medicine recently reported that "eye specialists" swindled $4,100 out of one family through their purported radium cure for blindness.

A $2,000,000 trust fund has been left to equip two hospitals in Detroit under the will of the late Emma J. Farwell. One institution will be devoted to contagious diseases, while the other will deal with diseases of the eye, ear, nose, and throat. Both institutions will be known as the Farwell Foundation Hospitals.

Work of the Lions International in aiding the blind was discussed at the meeting of the club in Denver, on November tenth. C. A. Kaufman, superintendent of the State School for the Deaf and Blind at Colorado Springs, reported on distribution of funds supplied for special aid to blind students. Dr. D. H. O'Rourke, of Denver, spoke on "Sight Saving."

The annual meeting of the National Society for the Prevention of Blindness was held in New York, November nineteenth. Dr. William Campbell Posey, Radnor, Pa., gave an address on "The Evolution of the Cataract Operation." Subjects for general discus-

sion included medical social service in eye hospitals and clinics, preventing eye troubles in infants, sight-saving classes, trachoma research, and prevention of industrial eye injuries. Dr. Benjamin F. Royer, Philadelphia, for the past six years medical director of the society, has resigned, effective December thirty-first.

At a dinner at the Missouri School for the Blind on November twentieth the Dana Medal for work in prevention of blindness was awarded to Mr. Edward M. Van Cleve, principal of the New York Institute for the Education of the Blind.

What is believed to be the first eye clinic established by a seamen's welfare agency in this country for the exclusive use of merchant seamen was opened on October thirtieth.

The clinic, which will be known as the John Markle Eye Clinic in tribute to the donor, Mr. John Markle, is under the professional supervision of Dr. Conrad Berens with Dr. G. Paccione in charge. It is the second of a group of special clinic units to be established by the Seamen's Church Institute, the first being a dental clinic which was opened on July twentieth of this year, in answer to the expressed need of merchant seamen for adequate medical and dental service.

Societies

The Section on Ophthalmology of the College of Physicians of Philadelphia met Thursday evening, November nineteenth. The program was participated in by the following: Drs. Charles E. G. Shannon, G. E. deSchweinitz, Alfred Cowan, Luther C. Peter, and P. S. Pelouze.

The following have been elected officers of the Cleveland Ophthalmological Club: president, Dr. Roy B. Metz; secretary, Dr. Paul G. Moore.

Personals

Dr. Edward K. Ellis has been made professor of ophthalmology at Tufts College Medical School, and Dr. Allen Greenwood has been made professor emeritus.

Dr. Park Lewis, vice-president of the Association Internationale de Prophylaxie de la Cécité, attended the annual meeting of this society and that of the Organisation Internationale de la Lutte contre le Trâchome, in Paris on November thirteenth and fifteenth, respectively.

Dr. George E. deSchweinitz, of Philadelphia, following the address which Dr. Vilray P. Blair gave before the ophthalmic section of the College of Physicians of Philadelphia on October fifteenth, invited the members of the section to a smoker at the University Club to meet Dr. Blair.

Dr. Luther C. Peter of Philadelphia was recently tendered a testimonial dinner by the Academy of Ophthalmology and Otolaryngology. This delightful and well earned testimonial marked the closing of fifteen years of active service in the Academy as acting secretary, secretary, president, and council member.

Dr. Hans Barkan, professor of ophthalmology at Stanford Medical School, has moved his offices from 490 Post street, San Francisco, and is practicing at Stanford University Hospital, San Francisco.

Drs. Thomas A. Woodruff and Thomas J. Murray announce their association in ophthalmic practice at the Mercer building, 309 State street, New London, Connecticut.

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